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# FIRE CONTROL

## HANDBOOK

### Region 4

1937



R. H. RUTLEDGE, REGIONAL FORESTER

(OAKLAND-5-6-37-1800)



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Ogden, Utah,  
March 5, 1937.

## FOREWORD

Since the R-4 fire control manual was first issued in the spring of 1932, and revised in 1935, considerably more experience has been gained in fire control work. A review of the large fires and of fire control work generally disclosed many items of good practice and revealed some weaknesses. Since a reprint of the manual is necessary, it seems an opportune time to make some revision, and that has been done.

The instructions in the 1935 manual are generally definite and clear. Nevertheless, in a few cases, and with respect to highly important matters, instructions were not followed and there was no reasonable excuse for their infraction. As examples, manual instructions relative to night travel to fires and staying with fires until they are extinguished were disregarded. In one case disregard of clear manual instructions resulted in a fire of 6,000 acres and big suppression costs, though it was entirely practical to limit the fire to Class A proportions.

It is desirable to encourage men to use individual judgment in many matters. But there is a limit to such a policy. It can not be carried to the point of disregarding the accumulated experience of many men over several decades.

Therefore certain instructions in this handbook have been made mandatory and are so indicated, and their disregard can not be excused on the ground that the forest officer used his best judgment. Infraction of such instructions will result in disciplinary action. All standard practices set forth in this handbook (even if not marked "mandatory") must be followed, unless there is good reason for the departure. Failure to follow such standard practices must be satisfactorily explained, else disciplinary action will result. Cases may arise where the facts will show that failure to follow standard practice or mandatory instructions has not resulted in more fires or in fires getting bigger. But this alone will not be sufficient excuse for failure to observe instructions. It is not intended to delay disciplinary action till departure from instructions results in unnecessarily big damage and costs. It will be insisted that instructions be observed in order to prevent or minimize damage and costs, nor will ignorance of any provision of this handbook be considered a reasonable excuse for failure to observe it.

Rangers must check on their guards and Supervisors must check on both to see that instructions *are* followed. When a subordinate fails, inquiry will be made to see whether he was fully instructed, checked and supervised by his superior officers in an effort to prevent his failure. In any case, it is less expensive and more creditable to prevent a failure than to take disciplinary action on a man after he has failed.

R. H. RUTLEDGE.

Regional Forester.

# SECTION I

## FIRE PREVENTION

### PRIORITY

With the exception of fire suppression and presuppression, fire prevention has priority over all other work in R-4. There is no honor due a forest officer for suppressing a fire that he should have prevented.

#### KEEP PREVENTION WORK ALIVE

Every forest visitor, including the through traveler, is a risk and must be dealt with accordingly. In 1931 on one forest in south Idaho there were 26 man-caused fires in the hunting season, which period was a continuation of the worst fire season on record in that region up to that time; immediately following the most widespread publicity about fire danger ever given in R-4; immediately following a reign of martial law which closed seven counties to travel. Some of the offenders had even been fighting the worst of forest fires a few weeks previously. If people can become immune to the lessons of such fires within so short a time, there most certainly is need for a *continual* drive throughout every period of hazard to impress every forest visitor *repeatedly* with the need of care with fire. To do this necessitates knowing: who will visit the forests; when, where; the best time, place and method to reach them with fire lessons; and who should do this work.

#### INFLAMMABILITY AND RISKS

The higher the hazard, the more the publicity that should be given fire control and the more time that should be spent on fire prevention work. Preparation for fire prevention should be made well in advance of periods of high hazard. But the most time must be spent on fire prevention during high hazard periods. Experience indicates conclusively that publicity a few months before the fire season is not sufficient. Firemindedness seems to be a rather temporary condition unless something is done from time to time to keep it alive. The best time to make an impression is when the hazard is highest.

#### PERMITS AND CHECKERS

Studies have shown that by the time certain relative humidity deficiencies are reached emergency conditions have developed. Emergency conditions are deemed to be sufficient to put the seven highest hazard fire forests on a permit basis, and to station checkers at all main entrances to the forests when the humidity deficiency reaches 120. (Explanation of humidity deficiency and its method of determination is fully explained elsewhere in this handbook.) When this deficiency is reached, the Regional Forester will issue an order requiring permits for entrance to the forests, and at that time the placing of checkers at main entrances is authorized and required in numbers that will be approved in advance by the Regional Office.

On roads with heavy traffic double shifts of checkers will be used, with single shifts of about 12 hours on roads with light travel. In any event, at



least 90 per cent of the travel as it enters the forests should be contacted by checkers stationed at the entrances. These men will issue permits to all travelers not specifically exempted, and will inform them of the hazard, caution them relative to care with fire, and explain the terms of the permit.

Such other checkers as may be authorized by the Regional Office will travel along roads and check at camp grounds, examine permits and issue permits to persons not contacted at the forest boundary, and give the same information and instructions as given by checkers at forest entrances.

It will be the duty of *all* guards during periods of closure, as well as at other times, to contact all persons possible, examine permits, record names, auto license numbers, and notify the Supervisor or dispatcher of any violation of whatever closing order may be in effect. No arrests will be made by guards unless they are specifically instructed to make an arrest.

Closing orders for the seven highest hazard forests will not be issued by individual forests but by groups as follows:

Group 1—Boise, Idaho, Payette, Weiser.

Group 2—Challis, Salmon, Sawtooth.

Other forests will be considered as individual cases on the initiative of the Supervisor.

Checkers will be taken off at the same time as other emergency guards, or when closing orders are rescinded.

### CLOSURE OF FORESTS

Complete closure of forests to entrance of all persons not residing within the forest boundaries or having legitimate business therein will be considered by the Regional Forester when the humidity deficiency reaches 180.

After any form of closing order is issued, permits will be issued. Use the following form as a guide:

.....National Forest Entrance Permit  
Mr. .... of ..... and party consisting  
of .....persons, mode of conveyance ....., auto  
license number ....., State of ..... is hereby  
granted permission to enter and be upon.....  
within .....National Forest during the period of  
..... to ..... for the purpose of  
.....

This permit is granted pursuant to the order of the Regional Forester, United States Forest Service, dated ....., and is subject to the following restrictions:

(Enter restrictions placed by order. If camp fires, limit to cooking only.)

It is understood and agreed by the permittee that in consideration of the issuance of this permit he will pay the cost of extinguishing any fire which he or any member of his party may start, and will pay for any damage done to the property of the United States by any such fire.

Failure to comply with the terms of this permit will render this permit null

and void and will make the permittee liable to action under the federal or state law.

Permit issued \_\_\_\_\_, 19\_\_\_\_\_

Signature of Permittee \_\_\_\_\_

Signature of Forest Officer \_\_\_\_\_

\_\_\_\_\_  
Title

### TERMS OF PERMIT

If smoking and the building of camp fires is permissible under the Regional Forester's order the following rules will be observed and are made a part of this permit:

- (1) Build no fire larger than necessary for ordinary camping purposes.
- (2) Build no fires except in places from which all inflammable material (refuse, grass, brush, roots, rubbish, needles, leaves) down to the mineral soil has been removed.
- (3) Start no camp fire until there has been cleared an area large enough to insure that neither the fire nor any spark from it will ignite any inflammable material outside the cleared area.
- (4) Do not leave, even for a short period of time, any fire without extinguishing it.
- (5) If enough water is not handy for thoroughly quenching the fire, place the fire in a hole dug in mineral soil and smother it with mineral soil before leaving. In windy weather dig a hole in the mineral soil and build fire in and confine fire to that hole. Stir fire thoroughly in applying water.
- (6) *Restrictions on Smoking*  
Smoking is permitted: (a) while traveling on roads, provided matches and tobacco are entirely extinguished before being discarded; (b) in camps and at places of human habitation; (c) at any other place free from inflammable material, provided the smoker absolutely stops traveling while smoking and entirely extinguishes his tobacco before resuming travel. Smoking is prohibited elsewhere or under any other conditions on National Forest lands.
- (7) Have in your possession a shovel, an axe of at least 2 pounds weight, and a water receptacle of 1 gallon or greater capacity. These are necessary in order to be able to comply with the above requirements.

### SURVEY OF RISKS

#### *History of Past Fires*

As a help in determining where and when man-caused fires are likely to occur, a record (map or in other form) showing location, area burned, and damage from past fires by classes of offenders, will help. However, no one should conclude from such records that fires will not occur elsewhere. Therefore, a survey of potential risks should be made and kept adjusted to changing conditions, such as new roads, opening or closing of fishing and hunting areas, new construction projects, etc., which affect time and place of public travel.

## Survey of Probable Risks

For every forest there should be a classification of human risks by periods somewhat as follows:

Period of Visit	Class of Visitor	Portion of Forest Visited	Degree of Hazard this Period	Approx. No. of People	Probable Reason for Starting Fires	Best Place to Deal With Them	Best Time to Deal With Them	Who Will Deal With Them	Method
Entire Fire Season	Fishermen Hunters Settlers Sawmill men Logging crews Sheepmen Cattlemen Summer home owners Lodge patrons Dudes Packers Day picknickers Overnight campers Through motorists Hikers Horseback riders Tramps and casuals Truck haulers Incendiarists Men on construction projects Convention visitors Survey parties Railroads and patrons	Lowman	Low	300	Campfire Smoking	In Camp	While on Forest	Ranger	Personal Contact



## METHODS OF REDUCING RISKS

Definite time and a method or procedure will be set up in the work plan of each forest officer who is to deal with visitors.

### *Personal Contact on the Forest by Forest Officers*

This is the most effective method. It can be done by checking visitors as they enter the forest, as is sometimes done during the hunting season; and as has been done in high hazard periods; by lectures at campgrounds or lodges; by talking with visitors in their camps.

Every ranger, dispatcher, lookout, campground patrolman, etc., should be given definite instructions on the following points:

1. Area to be patrolled.
2. Frequency of trips, indicating time of day and day of week.
3. Contacting the public. (Suggestive only.)
  - (a) Personal appearance to be of good standard.
  - (b) Approach to be courteous and tactful.
  - (c) Learn camper's interest, such as fishing, scenery, etc., and give information that will be of help to him in attaining his desires.
  - (d) Tell him points of interest and help him enjoy his stay.
  - (e) *Acquaint him with fire and sanitation rules and solicit his co-operation in their application.*
  - (f) Caution against injuring trees in any manner, especially at campgrounds.
  - (g) Supply visitor with one or more of the following:
    - Welcome tags.
    - Good Manners in the Forest—leaflet.
    - Strip maps.
    - Whitefish, Grayling, Trout and Salmon of the Intermountain Region—bulletin.
    - Bookmark containing fire rules.
    - Evergreen Trees of the Intermountain Region—booklet.
    - Forest Fires or Game—leaflet.
    - Card of introduction.
    - Welcome card showing a fisherman putting out fire.
    - Sportsmen's Code, etc.
  - (h) Train recreational tastes so visitor will learn to enjoy intelligent use of resources as well as their protection. Easterners or any one unacquainted with R-4 conditions need special attention.
  - (i) In some cases conduct "Show Me" trips.
  - (j) Pay special attention to making arrangements for accommodating large groups.
  - (k) Convey the idea that the Forest Service desires to serve and to be hospitable.
  - (l) Encourage recreational use.
  - (m) Avoid appearance of loafing.
  - (n) Temporary men avoid pretense of being a Ranger.
  - (o) Record number of visitors; amount of each kind of printed matter

distributed; public response to different kinds of service.

(p) Learn and suggest ways of making recreation more attractive for visitors.

(q) Avoid being a nuisance. Don't thrust yourself on people against their wish.

4. Frequency, time and place for talks given at camp fires, lodges, conventions held in the forest, etc.

The functions of every forest officer as to making personal contacts and as to other fire prevention work should be made specific in his work plans and time provided.

#### *Distribution of Printed Matter*

Fire prevention codes, as well as camp sanitation codes, might well be distributed with grazing permits, special use permits, or with membership cards in sportsmen's and other associations. Wherever State authorities are willing these codes should be transmitted with the State auto licenses and made a part of or enclosed with State fish and game licenses.

These codes, as well as map folders, strip maps, bulletins, specially prepared letters, cards of introduction, fire prevention bulletins, etc., should also be distributed to different classes of forest visitors or to specially prepared mailing lists. On some forests good use can be made of registration lists secured as visitors enter the forest or some particular campground. Such material can also be distributed by use of display racks in forest headquarters, libraries, service stations, etc., or given out by auto associations or by forest officers during their contact work on the forest or when giving talks elsewhere.

#### *Press*

As a rule the press is anxious to print fire warnings and fire news. Forest officers should keep them supplied with such information. Fire dispatchers are probably in the best position to furnish them these data. Some one on each fire forest should be given this job.

#### *Schools*

Every school within the Supervisor's territory should be furnished annually with fire prevention instructions, preferably by having this made a part of their regular course of study. This can be accomplished by furnishing the teachers with the information, by specially prepared text matter, or by talks given by forest officers or others on this subject.

#### *Exhibits*

Each forest should prepare a list of fairs, store windows, conventions, and other suitable places, including lookout towers visited by the public, where fire prevention exhibits should be installed. The South Idaho Timber Protective Association has made good use of its lookout towers for publicity purposes.

#### *Lectures, With or Without Slides or Reels*

These should be given to civic organizations, 4-H Clubs, Scouts, teachers' conventions, etc., as occasion offers, and there should be a determined effort



to develop opportunities for this sort of educational work. Where practical, the Supervisor should detail a man to make lecture tours to schools, etc., during the winter. But keep in mind that the winter period is not the best time to lecture on fire prevention. Lectures on fire control work in winter should ordinarily be given only when correlated with other subjects.

### *Radio*

Any especially interesting fire news will be welcomed at radio broadcasting stations. KSL in Salt Lake City has informed us that they will be glad to get such news provided it is secured promptly. Advantage should also be taken of opportunities to use the radio for this purpose throughout the year. When broadcasting fire facts, outside the limits of the fire season, connect them with other forestry matters more in season.

### *Signs and Posters*

There should be a definite plan for placing signs and posters. Postmasters were authorized September 7, 1915, to permit the posting of fire signs in lobbies of postoffices. Fire posters can also be placed to advantage in stages, trains, and other public places.

To the full extent it is practical, no fire warnings should be kept up on any area where no hazard exists and no emergency warnings when no emergency exists. Fire warnings may be so frequent and kept up so constantly as to lose any value they might otherwise have.

The question of so placing fire warnings as to make them most effective should be carefully considered. Put them where they are most likely to be read. A few words on care with fire put on a directional or informational sign will insure the fire slogan's being read whenever the rest of the sign is read. Fire signs can be placed to advantage at camps and at stream crossings where travelers stop for water.

Fire signs should not be placed too close together. There should be one at each campground where there is material fire hazard. On trails, at intervals of 3 or 4 miles is close enough; and on auto roads, twice that distance.

The practice of using board backs on which to mount fire signs is approved. An attractive mounting doubtless attracts attention to the fire sign, helps in getting it read, and in making the proper impression on the public.

### *Encourage Carrying Fire Tools*

During fire seasons all persons camping on National Forest lands should be encouraged to carry in their automobiles shovels, axes, and buckets, and *will be required to during permit periods.*

### *Restricting Hunting and Fishing*

Consider with the State Game Warden restriction to certain areas of hunting and fishing, or postponement of season, during an emergency fire period. The State or sportsmen themselves may be willing to cooperate in supplying sufficient patrol and sufficient checkers to make the entrance of hunters into the forest reasonably safe during bad periods.



### *Registration of Visitors*

Visitors may be encouraged to register at campgrounds or at forest boundary for the psychological effect in promoting fire-mindedness. People who register may also be furnished with some sort of fire prevention and other information by mail the ensuing winter. Registration will not be made mandatory except in emergency periods.

### *Fire-Proofing Campgrounds*

Camp grates or stoves will assist in preventing campers' fires from spreading. Some campgrounds will need fire lines around them. The campground itself should be kept free from litter and inflammable material, and trees will be well trimmed if this will reduce hazard.

### *Reducing Physical Hazards*

Areas having snags, slash, windfalls, bug-killed timber, sawmills, railroads, and other exceptional conditions constituting extra high hazard or risk, should be given any extra protection needed.

Each spring rangers will check up on all sawmills on their districts to see that reasonable precautions have been taken to prevent fire, and that forest permits and state laws are being complied with, particularly relative to presence and condition of spark arresters, disposition of slabs and sawdust, construction of fire lines. etc.

During emergency periods consideration should be given to shutting down sawmills and woods operations when they add materially to the risks, whenever forest regulations or state laws will permit.

### *Grazing Permittees*

The employer is responsible for the acts of his employees within the scope of their employment. At the least, it would seem to be reasonable to ask the permittee for civil damages for any fire started carelessly or maliciously by an employee within the scope of his employment, unless the permittee has done everything in his power in cautioning, instructing and supervising the employee in a sincere effort to prevent fires. Another remedy for failure to prevent fires on the part of stockmen is reduction of grazing preference, and this should be given serious consideration in cases of carelessness, neglect or maliciousness on the part of the permittee. Neglect of the permittee to instruct, caution and supervise his employees relative to care with fire should be considered sufficient cause for reduction of grazing preference, if such employees start forest fires.

Each spring prior to the opening of the grazing season stockmen should be contacted either personally or by circular letter in an effort to impress them with the necessity for care with fire on the part of their employees and themselves. Personal contacts during the season should be made as far as possible with owners, herders, camp tenders and association riders. Permittees should be told plainly that it is their duty to instruct, caution and supervise their employees.

The employment of herders and others known to be careless with fire should be discouraged. Particularly in the case of employees who have been

convicted of being careless with fire, permittees should be notified that their continued employment will be considered as an indication of unwillingness to assist in fire prevention to a reasonable degree and that in case of an additional fire caused by such employee, it may be necessary to ask the permittee for civil damages.

The following instructions taken from form No. 879, "Application for Grazing Permit," and from form No. 656, "Grazing Permit," should be observed by all grazing permittees:

"I also hereby bind myself and my employees engaged in the caring for the animals while on the forest independently and voluntarily to do all in our power to prevent and suppress forest fires on my allotment or in its vicinity, and to report promptly to the local Forest Officers all fires which I or my employees discover but which we cannot suppress through our own efforts. Unless prevented by circumstances over which I have no control, I agree to place at the disposal of any authorized forest officer myself, employees, and transportation facilities for fighting forest fires. Payment for such services shall be at the current rates of pay prevailing within said National Forest for similar services, unless I or my employees are directly or indirectly responsible for the origin of the fire, in which event no payment will be made for services so rendered."

"During the period covered by this permit the permittee binds himself and his employees while on or in the vicinity of the National Forest to extinguish all fires started by him or them. He will further do all in his power independently to prevent and suppress forest fires on his range allotment or in its vicinity and will require his employees to do likewise. Unless prevented by circumstances over which he has no control, the permittee agrees to place himself, his employees, and his transportation facilities at the disposal of any authorized forest officer for fighting forest fires. Payment for such services shall be at the current rates of pay prevailing within said National Forest for similar services. If, however, the Forest Supervisor holds the permittee or his employees directly or indirectly responsible for the origin of the fire, no payment shall be made for services so rendered."

## *Cooperation*

### *Appointment of Forest Cooperators*

Interest in fire prevention can be secured by issuing forest-cooperator-appointment cards to responsible citizens who are likely to be on the forest for any length of time, such as state game wardens, other state officials, stage drivers, truck drivers, key settlers, herders, members of the G.L.O., U.S.B.S., U.S.G.S., U.S.R.S., other prominent citizens. These appointments are signed by the Regional Forester and Supervisor upon recommendation of the Supervisor.

## *Law Enforcement*

### *1. Importance*

Before any law can be enforced successfully, public backing is essential.



Therefore, wide publicity should be given to the Forest Service policy in law enforcement and the reasons for this policy.

## *2. Treatment of Offenders*

Dealing with the offenders is a severe test of a forest officer's tact. He should endeavor to secure the respect rather than the antagonism of the offender. There are three types of offenders to be considered:

(a) Those leaving fires carelessly under conditions where damage is quite possible, but no appreciable damage has actually occurred before the fire is controlled.

*Action:* The offender should be taken before the Justice and a fine in keeping with the offense recommended.

(b) Those carelessly leaving fires that do considerable damage.

*Action:* Offender should be taken before the Justice and a fine appropriate to the damage should be recommended.

(c) Incendiaries.

*Action:* Regardless of the amount of damage done, arrest should be made and a heavy penalty should be recommended.

During very hazardous periods when there appears much danger of incendiarism, an effort should be made to get, through the Department of Justice or elsewhere, undercover men to check up on suspicious characters and to prevent incendiary fires or catch the fire bug.

## *3. Law Enforcement on Public Domain Fires*

Whenever forest officers take charge of fires on the public domain they should extend their law enforcement activities with just as much vigor as though the fire were on the forest.

## *4. Prompt Action Necessary*

Law enforcement action must be prompt to be effective, as delays tend to defeat the object of this procedure. Also evidence is lost with delay.

## *5. Rewards*

Plenty of publicity should be given the policy of offering rewards for information leading to arrest and conviction of offenders and to all law enforcement activities. These rewards go as high as \$500. (See Regulation T-2.)

## *6. Procedure in Gathering Evidence. Making the Arrest, Etc.*

(See "Fire Law Enforcement in the National Forests of the Intermountain Region" issued July, 1921, and also the Fire Trespass section of the Manual.)

## SECTION II

### PRESUPPRESSION

After all possible action has been taken in fire prevention, the next step is to make as ready as humanly possible to locate, go to and put out every fire, large or small, that may occur. This requires the possession of exact and detailed knowledge of the preparedness requirements of each protection unit; founded on analysis of fire history and changing conditions, fluctuations in intensity of danger, rates of spread, placement and training of all men, and probable present and future fire loads. History alone is not a dependable criterion of what may happen, but is merely a statistical record of what has happened, and we must be prepared to meet changing conditions of inflammability, occurrence and location of fires, and all other known factors. Successful fire control must be based on our being in advance of, rather than complacently following in the rear of, the whole fire game. History indicates that critical fire years are occurring at more frequent intervals, and due to drought and insect infestations the fire years have shown more severe burning conditions than they did in the past, and it is therefore necessary that we increase our standards of fire control to keep pace with the increased hazard.

#### *Responsibility*

The Supervisor is responsible for the state of preparedness of all available man power and all available material facilities for fire suppression on his forest and for the presentation of additional needs to the Regional Forester.

#### *Individual Accountability (Mandatory)*

Supervisors and rangers are personally accountable for maintaining the state of preparedness to acceptable standards. Failures brought to light through current inspection and which are not corrected promptly with the facilities at hand or available, whether they result in mishandled fires or not, will be grounds for appropriate disciplinary action. It should not be necessary to await the occurrence of mishandled fires resulting from poor preparedness action to initiate personnel action. The state of preparedness is a measurable thing which can be checked through searching inspection. The need for personnel action should be developed before the occurrence of the fire and not afterwards.

Better preparation must be made. The standard of this preparation on each forest will be established, and then supervision and inspection must tighten sufficiently to see that this standard of preparation is met and that Regional policies are observed. This will require more time on prevention and presuppression, but should result in a saving of time and expenses and damages on account of forest fires.



## FIRE STUDIES

In the beginning of National Forest administration, but few men of any material experience were available for fire control, protective improvements were scarce, and tools and equipment for fire suppression were largely lacking. Fires were numerous and a relatively big acreage was burned. As more men were employed and trained, more protective improvements were built, more tools and equipment for fighting fire obtained, the sum of fire suppression costs and damage has been decreased for comparable seasons. The process of building up and improving our protective organization and facilities should be continued as long as the additional cost is at least fully offset by the saving in suppression costs and the reduction in damage.

### *Fire Weather Indicators*

At all forest weather stations on the high hazard forests, the following weather instruments will be placed and weather information collected in accordance with instructions issued by the Regional Forester:

Psychrometer or hygrothermograph.

1/2 and 2" wood cylinders.

Wind gauge.

Rain gauge.

All regularly occupied fire stations will be furnished with rain gauges, and fire season precipitation records kept by individual storms.

### *Cumulative Relative Atmospheric Humidity*

This term has been coined in Region 4. Its concept is based on the general observation and knowledge that forest fire hazard varies directly with humidity conditions *generally or over considerable periods of time*, rather than on any particular day or at some specified hour.

By comparing fire and weather statistics a *base humidity* of 21% was developed for Boise, Idaho. As will be shown later, bases have also been developed for other stations. (Throughout this discussion, *humidity means humidity at 6:00 p. m.*)

The cumulative relative humidity and other weather records for any station in central Idaho should begin when 7 days have elapsed after May 31, with a 6:00 p. m. temperature of 83 degrees or more at Boise. This means a total of 7 days whether consecutive or not. All weather records at all fire weather stations should be kept continuously during the fire season. In order to obtain information on post season hazard the weather records will be continued after the close of the regular fire season at all occupied weather stations until post season danger is definitely over.

The record consists simply of the daily difference between 6:00 p. m. humidity and base humidity. When daily humidity is higher than base humidity it has a plus sign; if it is lower than base it has a minus sign. The

if at any time when the cumulative value has a plus sign, followed by a day with a minus sign, a new set of cumulative values will start from zero. *Any minus value will be plotted as a minus and beginning at the zero line, if it follows immediately after a day or days of plus values.*

An example of the form in which the tabular record should be kept follows:

TABLE 1  
Cumulative humidity record—Boise, Idaho, Base Humidity 21%

Date	6:00 P.M. Humidity (%)	Difference from 21%	Cumulative Humidity
June 21	16	— 5	— 5
22	18	— 3	— 8
23	19	— 2	—10
24	25	+ 4	— 6
25	30	+ 9	+ 3
26	35	+14	+17
27	18	— 3	— 3
28	13	— 8	—11
29	10	—11	—22
30	30	+ 9	—13
31	35	+14	+ 1
July 1	27	+ 6	+ 7
2	14	— 7	— 7
3	10	—11	—18
4	11	—10	—28

Note that cumulative values are continuous till June 26, on which date the cumulative value is plus 17. On June 27 there is a minus 3. Drop down to the zero line and plot it as a minus 3, and continue plotting cumulatively until the cumulative values return to a plus. Whenever a cumulative plus occurs followed by a daily minus, drop to the zero line and plot from it.

The Weather Bureau at Missoula will notify each central Idaho forest and the Regional Office when seven days after May 31 have elapsed with a 6:00 p. m. temperature at Boise of 83 degrees or more and will thereafter show cumulative humidity at Boise on the daily weather forecast.

#### *The Humidity Chart*

The cumulative values should be plotted, as they furnish a better general picture of conditions than does an examination of the figures. Use any cross section paper with 10 divisions to the inch, and count each division horizontally as one day and each division vertically as two points. This will simplify examination of the charts for several forests at one time.

The record for the several stations on a forest should all be plotted on the same sheet, using different symbols for each station.

The record and the chart should be as nearly continuous as possible. Since there are bound to be days on which observations are not made, interpolations may be made as follows:



cumulative humidity on any day is the algebraic sum of daily differences from base, except as provided in the second paragraph below.

The medium and low hazard forests are characterized by summer precipitation greatly in excess of that normal for central Idaho. This results in building large surpluses above humidity base, sometimes to the extent that it might not be wiped out in an entire season.

In order that cumulative humidity may be used as a hazard indicator for any forest, daily differences from base will be accumulated as heretofore, but

TABLE 2

With Humidity at Boise	Probable Humidity At			
	Council Garden Valley R. S. South Fork R. S. Teapot Mt.	Cascade Challis Idaho City McCall Peck Mt. Salmon Shake Cr. R. S.	Brundage Mt. Cape Horn R. S. Granite Mt. Grass Mt. Landmark Pilot Pk. Sagebrush Mt. Shafer Pk. Sawtooth Valley R. S. Short Creek Pt. Tripod Mt. West Horse Mt.	
8	12	16	17	
10	13	18	19	
12	15	19	21	
14	16	21	23	
16	17	22	25	
18	19	24	27	
20	20	25	29	

Use of radio or examination of figures in fire weather forecasts will make it possible to interpolate for missing humidity record at any point. It should be understood that the interpolation table should be used only when necessary, as possible error may be high, particularly when the interpolation is on a day with very high humidity.

#### HUMIDITY BASE FOR OTHER STATIONS

Humidity base for stations at which humidity records have been kept, were computed by correlating daily humidity at Boise when below 21%, with outlying stations.

The calculated bases follow for stations considered essential to show conditions generally over all parts of each central Idaho forest:

TABLE 3

Station	Humidity Base	Record to be Kept by
Acorn Butte .....	34	Idaho
Boise .....	21	Boise
Brundage Mt. ....	35	Idaho
Burgdorf R. S.....	31*	Idaho (Not required)
Cape Horn R. S.....	32	Challis
Cascade .....	27	Payette (Not required)
Challis .....	28	Challis
Cougar Cr. ....	36	Challis
Council .....	21	Weiser
Garden Valley R. S.....	22	Payette
Granite Mt.....	31	Salmon
Grass Mt. ....	31	Idaho
Idaho City .....	24	Boise
Landmark .....	32	Payette
Lowman .....	24	Boise and Payette (Not required)
Mahoney Pt.....	36*	Payette and Challis
McCall .....	27	Idaho
Peck Mt. ....	27	Weiser
Pilot Peak .....	36	Idaho
Sagebrush Mt. ....	34	Salmon
Salmon .....	24	Salmon
Shafer Peak .....	35	Boise
Shake Cr. R. S.....	27	Sawtooth and Boise
Sawtooth Valley R. S...	33	Sawtooth and Challis
Short Cr. Pt.....	36†	Salmon
South Fork R. S.....	22 (Use 4:00 p. m. humidity)	
Teapot Mt. ....	29†	Idaho
Tripod Mt. ....	36	Payette
West Horse Mt.....	34	Salmon

\* Based on elevation.

† From approximate elevation

A need has developed at fire weather stations, particularly those with a high base, for a check on cumulative relative humidity. Also the medium and low hazard forests need further fire weather information.

Therefore, psychrometers, wood cylinders, wind and rain gauges will be installed at all fire weather stations.

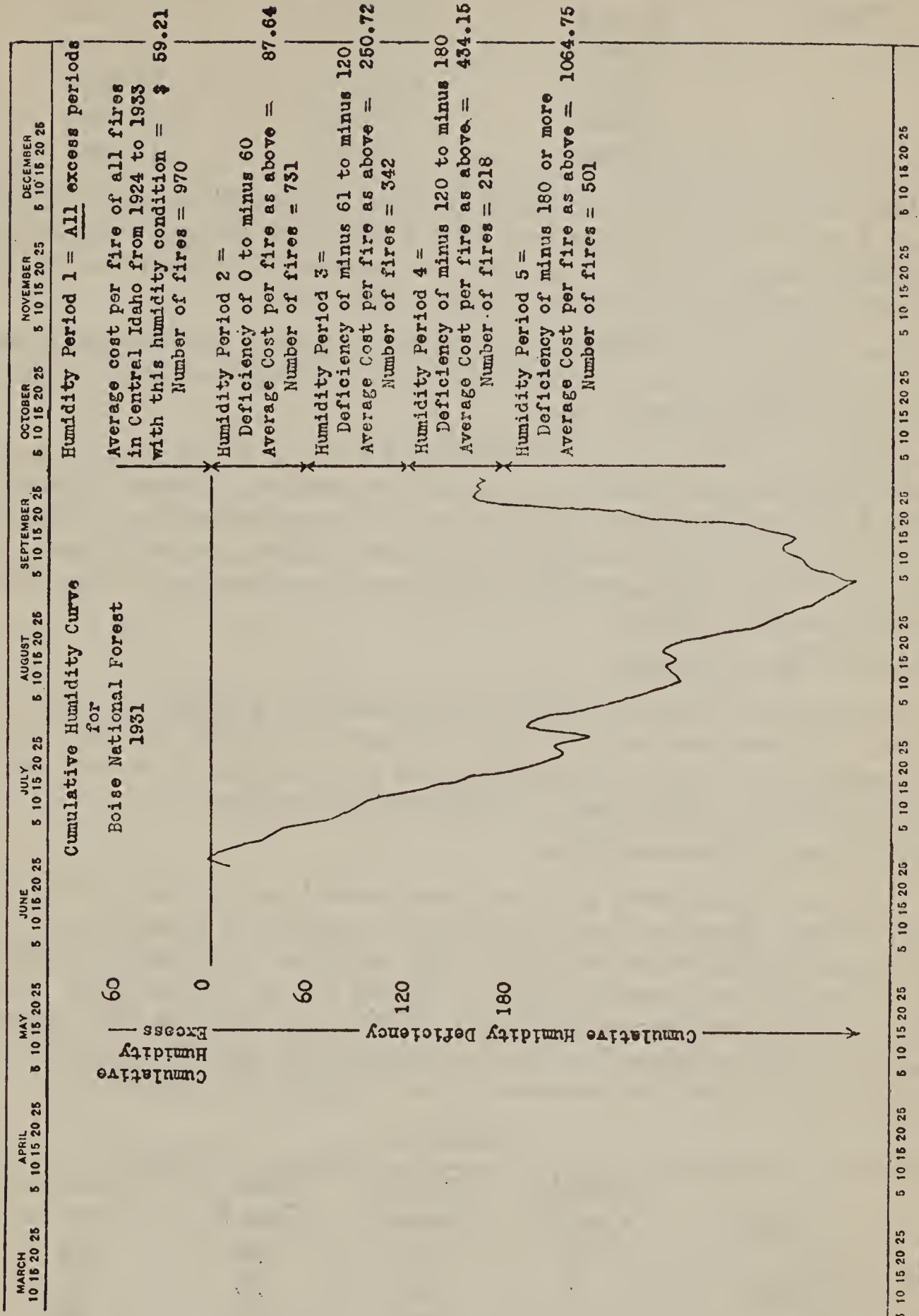
#### *Interpretation of Humidity Chart*

All values of cumulative humidity with a *plus sign* are called *humidity excess*; those with a *minus sign* are called *humidity deficiency*.

Shown in the chart below is a typical cumulative humidity curve for a critical fire season, with a division of the season into five general periods.



TABLE 4



A division of the total time in the fire season, total number of fires, and total suppression cost on the seven central Idaho forests for the period 1924-1933 follows:

### *Length of Humidity Periods*

Based on the record at Boise for the past 37 years, it is expected that humidity periods will extend over the following number of days:

Period	Probable Shortest Time	Average of Worst Half of Years	Average of all Years
2	8 days	10 days	14 days
3	7 days	8 days	12 days
4	6 days	9 days	12 days

That is to say that plans should be made so it will be possible to have period 3 guards all placed not later than 8 days after the beginning of period 2; period 4 guards placed 7 days after the beginning of period 3 and period 5 guards placed 6 days after the beginning of period 4.

These figures are listed as a guide to what may be expected. Current humidity indicators will, of course, be used and action modified to meet the conditions of any particular year.

Period 1, 2, and 3 guards will be placed every year, but may be used and paid on improvement work if not needed for fire duty. Records indicate that period 4 guards need be placed only once in three years on the average. Plans should be made to obtain on short notice and to place the additional men in any year. Period 5 organization probably need be placed only about twice in nine years on the average.

#### *The End of the Fire Season*

The beginning of the fire season is determined by a method already shown. Statistics indicate that the end of the fire season is usually the date on which the humidity curve has ascended 100 points practically continuously any time after September 1. The season of 1936 was an exception.

#### *The Fire Guard Placement Plan*

A fire guard placement plan has been worked out for each of the central Idaho forests. Placement varies widely by cumulative humidity periods as may be seen in the following table. With reference to value of resources, it should be said there is set up by the Forester but one standard for fire control, *i. e.*, the corralling of all fires by 10:00 a. m. the day after discovery. However, in case sufficient funds are not available to meet this standard on all areas, then the value of the resource should be given due consideration.

TABLE 5

Forest	Period 1 Guards	Period 2 Guards	Period 3 Guards	Periods 4 and 5 Guards
Boise .....	9	14	30	70
Challis .....	8	12	23	75
Idaho .....	13	26	56	99
Payette .....	8	13	35	80
Salmon .....	12	19	38	86
Sawtooth .....	3	6	8	17
Weiser .....	5	6	12	44
TOTAL.....	58	96	202	471



Suppression Squads will be placed in periods 4 and 5 upon specific recommendations of the Forest Supervisor and approval by the Regional Forester. Supervisors may man emergency spots when justified by at least two separate humidity readings or with humidity and wood cylinder correlated readings in the same general locality.

When the majority of humidity stations on a forest indicate period 4 and 5 emergency conditions, a general forest emergency will be considered for the manning and emergency guard placement.

#### *Releasing Emergency Guards*

They may be released when the cumulative humidity curve has climbed 60 points continuously (or practically so) any time after August 25.

#### *Emergency Periods on Medium Hazard Forests*

This refers to the Wasatch, Ashley, Cache, Caribou, Minidoka, Wyoming, Teton, and Targhee Forests. This arrangement is by geographical grouping.

The table which follows shows normal precipitation for individual stations located on the medium and high hazard forests and is generally representative of conditions at about the lower altitude of tree growth. They afford, collectively, a general picture of normal conditions. The heavier normal precipitation in July, August, and September on the medium hazard group is principally the reason why hazard is normally not high. Even if summer precipitation on them drops to 50% of normal, these forests are then only about on a par with the high hazard group, when precipitation on the latter is normal.

When the high hazard forests have precipitation less than normal up to the end of June, the chances are that the season will be bad and the degree of severity rapidly increases as the preseason precipitation decreases below normal.

From this it follows that the medium hazard forests must have either an abnormally light winter or summer, or both, to produce high hazard. Bad fire seasons for this group have been characterized generally by winter precipitation of 75% of normal or less, or by one or more of the months from June to September with precipitation of 50% of normal or less—as a rule only a small fraction of normal.

With precipitation as a general indicator of fire hazard and the use of cumulative humidity as revised herein, the medium hazard forests should be able to measure hazard as accurately as can be done in central Idaho.

All forests of low and medium hazard should make a start not later than June 1st on obtaining fire weather data. Fire weather anywhere is characterized by weather factors capable of measurement to at least some extent. Each medium hazard forest, therefore, should maintain at least three weather stations located so as to give data representative of conditions on more hazardous parts of the forest. Low hazard forests should maintain at least one fire weather station. Each station should have at least the following equipment:

- 1 Forest Service Rain Gauge, cost \$1.00
- 1 Set Wood Cylinders, 1½" and 2", and Scales for weighing, cost \$12.50

- 1 Sling Psychrometer, cost \$5.00
- 1 Forest Service Wind Gauge, cost \$3.00

These weather stations should be located at regularly occupied forest stations.

Continuous records should be maintained so that data may be accumulated and methods evolved which will indicate approach and severity of fire weather.

(See U.S.D.A. Circular 398—Measuring Fire Weather and Forest Inflammability.)

TABLE 7

Normal Precipitation High Hazard Forests							
		Oct. 1 to Feb. 1 to					
Station	Jan. 31	May 31	June	July	Aug.	Sept.	Total
Boise .....	5.82	5.40	0.92	0.24	0.19	0.53	13.10
Challis .....	2.08	2.55	0.94	0.54	0.54	0.78	7.43
Hailey .....	6.95	5.72	0.88	0.50	0.48	0.73	15.26
Idaho City .....	10.32	8.15	0.85	0.47	0.50	0.75	21.04
New Meadows .....	10.16	7.72	1.48	0.61	0.63	1.10	21.70
Obsidian .....	7.14	5.73	1.20	0.65	0.79	1.01	16.52
Average .....	7.08	5.88	1.04	0.50	0.52	0.82	15.84
Cum Average..	7.08	12.96	14.00	14.50	15.02	15.84	15.84
Medium Hazard Forests							
		Oct. 1 to Feb. 1 to					
Station	Jan. 31	May 31	June	July	Aug.	Sept.	Total
Afton .....	5.68	6.54	1.32	1.16	1.34	1.62	17.66
Ashton .....	5.99	5.61	1.45	0.96	0.68	1.16	15.85
Evanston .....	4.44	5.66	0.97	0.98	1.08	1.12	14.25
Heber .....	6.41	6.47	0.62	0.85	1.04	1.15	16.54
Jackson .....	5.64	6.21	1.05	0.95	1.59	1.95	17.39
Laketown .....	4.46	5.19	0.77	0.65	0.84	1.23	13.14
Manila .....	2.57	4.09	0.66	0.97	0.96	1.10	10.35
Pinedale .....	2.75	3.27	0.95	0.93	1.24	1.23	10.37
Average .....	4.74	5.38	0.97	0.93	1.10	1.32	14.44
Cum. Average..	4.74	10.12	11.09	12.02	13.12	14.44	14.44

Each Supervisor's office concerned will arrange to have furnished to it the *monthly* climatological sheets published by the Weather Bureau.

#### *Fire Hazard on Insect Control Work*

Several expensive fires on insect control jobs have indicated the need for some guide as to when insect control burning is dangerous. A simple method has been devised that requires a minimum of record keeping. No instruments whatever are required, as the records of Cooperative Weather Bureau Stations will be used.

Maximum daily temperature will be used exclusively until a better method can be devised. It is, to a considerable extent, a reflection of precipitation



and humidity. Study of fire control costs in central Idaho and maximum temperature at Boise indicates a maximum of 80 degrees to be the point at which the general run of forest fires begin to cause trouble. Maximum temperatures at each of the places mentioned hereafter have therefore been correlated with maximum temperatures at Boise, with exceptionally good results.

At the beginning of insect control burning in the spring, the total precipitation from October 1 (of the preceding year) to May 1 should be obtained direct from the Weather Bureau or from the cooperative observer at the station nearest to the job.

The following tabulation shows a combination of winter precipitation (October 1 to May 31) with average maximum temperatures that will result in burning conditions serious enough that extra precautions will be required. If the condition continues long enough, insect control burning will have to be stopped.

TABLE 8  
Three-Day Moving Average Temperature Indicating Hazard

Winter Precipitation (Oct. 1-May 31)	Afton	Ashton	Evanston	Montpelier	Pinedale	Salt Lake
4 inches or less.....	69	69	67	71	64	75
4.01 inches-6 inches....	72	71	70	75	68	79
Over 6.01 inches.....	76	74	74	79	71	82

A systematic record will be kept for the nearest weather station to each camp in the following form:

TABLE 9

Date	Maximum Temperature	3-Day Moving Average
May 1.....	70	
2.....	74	
3.....	73	72 (Mean of 1st, 2nd, and 3rd)
4.....	78	75 (Mean of 2nd, 3rd, and 4th)
5.....	81	77 (Mean of 3rd, 4th, and 5th)
6.....	78	79 (Mean of 4th, 5th, and 6th)
7.....	75	78 (Mean of 5th, 6th, and 7th)
8.....	72	75 (Mean of 6th, 7th, and 8th)
		etc.

Any time the figure in column 3 of Table 9 exceeds the value for the station nearest the insect control operation, extra precautions must be taken with fire.

The weather observer at these places at the present time follows:

Afton.....	C. J. Hepworth
Ashton.....	H. M. Goebel
Evanston.....	Jas. E. Cook
Montpelier.....	U. S. Forest Service
Pinedale.....	Carl F. Crane
Salt Lake.....	U. S. Weather Bureau

## *Cumulative Humidity and Rainfall*

Rain maps will be kept by each of the high hazard forests. The Regional Forester will submit detailed instructions for keeping rain maps.

The cumulative humidity curve (or table) for Boise City may be used as a method of forecasting precipitation.

When humidity at 6:00 p. m. at Boise *has been below 21%* for any number of days, a rise of 11% (to 32%) in *one* day will be preceded, accompanied or followed by precipitation at Boise *in some amount*, ninety-five times out of a hundred.

When 6:00 p. m. humidity *has been below 21%* at Boise for any number of days, *an average rise of 5% or more for two or more days* will be preceded, accompanied or followed by rain in ninety-five cases out of a hundred.

This method *does not always serve as a forecast*, as in some cases rain may fall in the afternoon and the rising humidity not appear until 6:00 p. m.

Study of available records indicates no relationship between rising humidity and *amount of rainfall*, a trace of rain often causing a large rise and a fairly heavy summer rain causing only a minor rise.

No records other than for Boise have been examined, but it is believed the same thing may be expected at other stations similarly located as to altitude and site and having approximately the same humidity base.

## FIRE PLANS

Fire plans for the Region shall consist of:

R-4 Fire Control Handbook which contains Region-wide instructions.

Forest Fire Protection plan, consisting of:

1. The Fire Atlas.

(1) Volume of work map.

Showing starting point of fires separately, beginning with 1922.

By Class A - . a dot; B - o small circle; C - x small cross.

By Cause—Lightning fires

Higgin's carmine ink

Campers and smokers

Sanford's green ink

Railroad fires

Higgin's blue ink

Other fires

Higgin's orange ink

(2) Hazard maps.

Showing all fires over 40 acres in actual area by years. (Circumscribe each area and lightly hachure in red.)

(3) Visibility map.

(4) Sheets A to LM, as follows:

Sheets	Data	Prepared by	Copy Main- tained in R. O.
A	Costs	All Forests	Yes
B	Tabulation by causes	All Forests	Yes
D	Ten-day record by causes	Fire Forests	Yes
E	Detection record	Fire Forests	No
F, G, H, I	Elapsed time. Work sheets	Not required to keep in permanent form	No
J	Elapsed time summary	Fire Forests	Yes
K	Man-caused fires and law enforcement	All Forests	Yes
LM	Damage record	All Forests	Yes
	(5) Organization Charts.		
	(6) Forest Plan of Action.		
	2. Special Instructions to:		
	Rangers.		
	Guards.		
	Dispatcher.		
	R. & T. Foremen		
	Other Special crews.		
	3. Emergency Plan.		
	4. Cooperative Agreements.		
	5. Regional Overload Plan.		

A fire guard placement plan has been worked out for each forest in central Idaho and approved by the Regional Office. Copies of these plans, in bound manuscript form, are in each Supervisor's office. Until it can be shown that these plans are inadequate or overadequate they will be placed in effect by fire weather periods. Particular attention is directed to the provisions for manning in *extra emergency periods* as provided in Table 11 under Fire Studies.

### *Revision of Plans*

The Supervisor will check present guard placement plans to see that proper placement of guards is secured, and make annual recommendations for revision to the Regional Forester.

### *Outline For Forest Plan*

In preparing this plan avoid unnecessary duplication of the instructions in the R-4 Fire Control Handbook. It is not intended that all of the items appearing in the following outline will apply to every forest or that every special condition on individual forests will appear in the outline. The outline is intended primarily as a guide and must be so considered by the person preparing the individual plan.

#### 1. *Destructible Resources:*

Timber.

Area.

Types.

Age classes



Estimate by species.

Value.

Forage.

Amount.

Value.

Watershed.

Recreation.

Wild life.

2. *History of Past Fires:*

Man-caused fires.

Number and size.

Zones of occurrence.

Time of occurrence.

Causes.

Classes responsible.

Lightning fires.

Number and size.

Zones of occurrence.

Time of occurrence.

Reasons why fires get away.

3. *Danger Reduction:*

Brush disposal.

Forest lands.

Private lands.

State law enforcement.

Persuasion.

Sawmills.

Spark arresters.

Fire line.

Clean up.

Steam and gas pump, with hose.

Organization of mill crew for fire control.

Small tools and equipment.

Campers.

Clean up of campgrounds.

Patrol of campgrounds.

Improvement of campgrounds.

Fire line around campgrounds.

Concentration of campers.

4. *Fire Prevention:*

Exhibits.

Fairs.

Schools.

Libraries.

Window displays.

Lectures or talks.

Motion pictures or slides.



Newspapers.

Printed material:

Signs.

Posters.

Maps.

Pamphlets.

Road logs.

Slips (with slogans, road information, etc.).

Distribution of printed material:

Automobile clubs.

Boy scouts.

Chambers of Commerce.

Auto camps.

Service stations.

Libraries.

Mailing lists.

Schools.

Fire Law Enforcement:

Collecting evidence.

Making arrests.

Filing complaints.

Law enforcement publicity.

Contacts with Local Officers:

County Attorneys.

U. S. Commissioners.

Probate Judges.

5. *Discussion of Hour Control Standards:*

First line defense.

Second line defense.

6. *Cooperation:*

Miners.

Settlers.

Loggers.

Stockmen.

Special use permittees.

Ranchers.

Tourists and campers.

7. *Cooperative Agreements with Adjoining Forests:*

Roads, trails, telephone lines.

Detection.

Patrol.

Chasing smoke.

Exchange of equipment.

Assistance on large fires.

Overhead.

Road crews.

Temporary fire-fighters.

8. *Cooperative Agreement with B. P. R.:*
  - Responsibility of contractors.
  - Fires caused by employees.
  - Other fires.
  - Disposal of slash.
  - Method.
  - Time of burning.
  - Supervision by forest officer.
  - Burning permits.
  - Furnishing equipment.
  - Responsibility of bureau men.
  - Fighting fires.
  - Appointment of fire chief.
9. *Cooperative Agreement with G. L. O.:*
  - Responsibility of survey crews.
  - Reporting public domain fires.
10. *Cooperative Agreement with National Park Service:*
  - Detection.
  - Chasing smoke.
  - First call on fires near boundary.
  - Communication.
  - Assistance on large fires.
  - Overhead.
  - Organized crews.
  - Equipment.
11. *Cooperative Agreement with U.S.R.S.; S.C.S.; D.G.:*
12. *Cooperative Agreement with State Game Warden:*
13. *Cooperative Agreement with Biological Survey:*
14. *Cooperative Agreement with Telephone Companies:*
15. *Cooperative Agreement with Power Companies:*
16. *Cooperative Agreement with Protective Associations:*
  - Location of men.
  - Period of employment.
17. *Personnel:*
  - Location governed by:
    - Hour control.
    - Special hazards.
    - Detection.
  - Number needed:
    - Smokechasers.
    - Lookouts.
    - R. & T. crews.
    - Special per diem guards.
    - Per diem guards.
  - Selection.
    - Smokechasers.

Lookouts.

Forest students.

Other men.

R. & T. men.

Physical and mental qualifications.

Age limits.

By whom hired.

Eye test for lookouts.

Training.

Emergency guards.

Smokechasers and lookouts.

Per diem guards.

Road and trail men.

Other members of organization.

Cooperators.

Training outlines.

*Firefighting:*

How to get overhead.

Lists of local men.

Regional Office.

Other forests.

Region 1.

Sources of labor.

Lists of available men.

Region 1.

Transportation of men, tools and equipment, and provisions.

*Miscellaneous:*

Discuss any need for additional:

Smokechasers.

Lookouts.

Telephone lines.

Pastures.

Quarters.

Roads and trails.

Discussion of detection:

Primary.

Secondary.

Patrol.

Associations.

Cooperators.

Stage drivers.

Truck drivers.

Train crews.

Airplanes.

Acreage of allowable burn.

Organization charts.

Fire tool lists:

Number and size kept assembled at forest headquarters and elsewhere.

- Stock of replacements.
- Special equipment.
- Method of purchase.
- Ration lists:
  - Method of purchase—storage.
- Compensation Cases:
  - Action to be taken re hospitals and doctors.
  - Medical attention for men in the field. Hospitals and doctors.  
(See Sec. 6, Act of March 3, 1925.)
- Damage appraisals:
  - By whom made and when.
  - Class B fires.
  - Class C fires.
- Fire routine: when certain jobs will be done.
- List of reports.
- Annual review of past season's fires.
- Revising fire plan.

*Plan for Project Sales:* On each forest where timber sale operations are carried on in sufficient volume to make practicable the organization of employees of operators into fire control units, steps should be taken to do this and each such unit should be furnished a written plan of action. Following are some of the items that should be considered in preparing a plan of action:

*Officer Responsible for Protection:*

- Man in charge of sale. (Forest officer or employee of operator.)
- Ranger.

*Fire Tool Units:*

- In camp.
  - On locomotives.
- Organized Woods Crews:
- Fire Bosses:
- Special Patrolmen:
  - In woods.
  - Along railroad.
- System of Signals:
- Smoking:
- Closing to Tourists:
- Contract Clauses Relating to Fire:

*Outline for Emergency Plan:*

- Factors to consider in determining whether emergency exists.
- Emergency Guards:
  - Number and location.
  - Plan for equipment.
  - Lists of available men.
  - Emergency pack string, hiring and holding
- Flying Squadrons:
- Use of Road and Trail Men:



- Plan for shifting.
- Use of C. C. C.'s.
- Overheads:
  - Shifting regular men.
  - Lists of key men for overhead.
  - Other Forests' and R. O. Personnel.
- Restrictions on Public:
  - Closing of roads or areas to travel and any other restrictions.
  - Methods of enforcement of all restrictions.
  - Closing of sawmills, etc.
- Fire Fighters:
  - Source of supply.
  - Subsistence.
  - Transportation.
  - Employment and Contracting Officers.

## EMERGENCY PLAN

(See National Forest Manual, Page 59-A)

An emergency plan has been prepared for all main fire forests covering emergency guard placement.

A plan for emergency guard placement will be made for each medium hazard forest by the Forest Supervisor, and approved by the Regional Forester.

All forests in high and medium hazard groups will prepare an additional emergency plan in accordance with outline above. These need not be sent to the Regional Forester.

### *Smoke and Haze*

When detection is restricted 25% or more by reason of smoke and haze, placement of prearranged and planned guards to cover blind areas is permitted during periods when cumulative humidity deficiency reaches 90 or more. Our lookouts are generally placed at maximum distances apart for periods when visibility is good.

### *Sitting Tight*

Under emergency humidity conditions at the occurrence of lightning storms, improvement men and per diem guards may be sent to telephone, held in readiness, held at point covering blind areas, etc., and such men shall be considered as emergency guards during the time so held from their regular work.

### *Employment Agents*

During emergency periods the Boise or Payette Supervisors may employ one or two men as needed as fire employment agents in Boise. If these men are not available in Boise, they will be furnished from the Regional Office upon request from the Boise or Payette.

## REGIONAL OVERLOAD PLAN

During years materially worse than normal, it will be necessary to shift the Regional personnel for fire control.

These shifts will be of two kinds:

1st, for quick fire suppression overhead.

2nd, primarily for training details to going fires.

There must be alertness and knowledge upon the part of the fire forests of a threatening crisis and moral courage to call for help before being completely swamped. Prompt cooperation of the forest furnishing such men is necessary, and in like manner the fire forests should play a fair game and release such men as soon as a crisis is past.

Quicker mobilization and transportation is necessary than in the past. This involves quick concentration by auto at nearest landing field and thence by plane to the forest in distress if this will save time.

To make proper plans, a systematic survey of the Regional personnel is necessary. The Regional Office and each forest will fill out the Regional Overload Plan form for every permanent employee unless excepted by the R. O. These will be assembled in the Regional Office and an emergency call list prepared on the same form, for use in making any necessary shifts. Copies of the emergency call list will be furnished the fire forests for their use in placing any help that may be furnished.

Shifts of forest personnel to the high hazard forests will be kept to an absolute minimum. *All fire forests will make a greater effort to develop and train sufficient overhead for their fire control needs.*

Advance arrangements will be made with local grocery stores and wholesale houses to have available on each forest, on short notice, fire food supplies, with definite arrangement made to return unused supplies for credit, if they have not been opened or damaged.

### Personnel Ratings

Name

Ability to handle men in numbers of:

Up to 25 men

25— 50 men

50—100 men

100—250 men

250—500 men

500+

Judgment

Poor, fair, good, excellent

Initiative

Poor, fair, good, excellent

Knowledge of Fire Suppression Technique

Poor, fair, good, excellent

Fire Training Days



Fire Experience  
Days  
Position  
Camp boss only  
Scout only

## COMMISSARY

Commissary items should be sent to fire camp when the fire is more than two days old and is expected to continue at least several days. A commissary container box with lock should be furnished to handle all commissary. Items to be included are:

Tobaccos, chewing and smoking.

Cigarettes.

Cigarette papers.

Socks.

Gloves.

Shoestrings.

Shoe soles.

Shoe nails.

Hobnails.

Other articles will be furnished upon written requisition.

## ORGANIZATION OF MAN POWER

The regular fire control organization plan for any forest shall contemplate sufficient man power to satisfactorily handle any situation that may arise in the average year. In addition to the regular organization, each forest fire plan, when taken in connection with the Regional plan, will provide for expansion to adequately meet any emergency condition that may occur. For expansion purposes during abnormally hazardous periods, emergency guards shall be placed to serve specifically described purposes at well-selected points agreed upon in advance. The specific purpose to be served and the point of service for each man must be listed in each forest fire plan. Such emergency guard plans will be effective only after approval by the Regional Office, and men will be placed only at such times as the degree of hazard then existing at each point of placement is comparable to or worse than the conditions specified in the plan.

In organizing man power the authority, function, and responsibility of each man must be definitely determined and fully understood in advance. Each officer to whom authority is delegated must assume full responsibility for the exercise of that authority. The available man power will be segregated into first and second line defense, definitely classified, assigned and instructed as far as practical prior to the opening of the fire season.

*First Line Defense:* The first line defense, consisting of the permanent organization, regular protection guards, per diem guards, and cooperators, must be so distributed as to reduce to the minimum elapsed time from start of the fire to arrival of the first man. First line defense organization is the most important step in fire control work. It follows, therefore, that the needs

of a forest must be carefully analyzed and planned. As necessary steps to do this the following action will be taken:

1. Preparation of visibility maps for every fire forest and cooperative territory of adjacent forests.
2. Type maps using standard fuel types.
3. Hazard maps showing various degrees of inflammability and occurrence of past fires.
4. Transportation and organization study maps based partially at least on travel actually timed.

Before the Forests can proceed with some of this work, the Regional Office will assist the Forests in doing the following:

1. Set up standards of travel time for each zone.
2. Decide on the number of zones and define each.
3. Set up requirements or objectives for each forest.
4. Revise and standardize instructions for the preparation of transportation and organization studies.

In planning an adequate first line organization for either the normal or abnormal year, we should consider the personnel, plans and resources of all cooperative agencies and attempt to organize on the basis of one combined organization regardless of boundary lines. Definite written agreements should set forth the responsibilities and functions of each agency.

In order to have replacement material for guards or lookouts and material for emergency guards and overhead for fire suppression work available when needed, men qualified and trained for such positions should be employed in improvement crews to the fullest practicable extent and consistent with the demands of the improvement work and funds available.

To have information on the available local men qualified for overhead positions on suppression work, each fire forest will build up and maintain some form of record of known men qualified for such positions. This record should show the following suggested information:

Name and address, phone number, if any, age, physical condition, regular or usual employment, whether or not regularly employed, extent of experience in fire work, where obtained, position for which best suited, position qualified to fill, ability to handle men, and if employed on fire work during the season, character of work performed and whether satisfactory or unsatisfactory.

In organizing first line defense, care must be taken to select only men of the highest efficiency in fire control work. The ability to go to and suppress a fire must be the deciding factor in selecting these men. Because of the contact of guards with the public, consideration must be given also to their personality and neatness of appearance.

Every effort should be made to test the ability of each man early in the season. Those that do not measure up to the standard requirements and cannot be trained to that standard in the limited time at our command will be replaced promptly.



Every man whose duty it will be to chase smoke should get acquainted with his unit not later than the beginning of the period of high fire hazard. Travel over the unit maintaining trails and telephone lines may be sufficient, and may not be.

Fire control work is strenuous work and no one who is not in fine physical condition should be employed and we will not take men from relief agencies for fire suppression work who cannot meet this standard. It would be unfair both to the men and the job. A suggested age limit on guards is 21 to 40 for initial employment. Only in exceptional cases should men over fifty be employed.

Forest school students may be employed even though outside this age limit. Also men now annually employed who show high efficiency and effectiveness may be retained upon a clear showing of such exceptional qualities.

All lookouts who have not previously done so will be required to take standard eye-sight tests for lookouts as specified by the Regional Forester, and may be required to take tests periodically.

The guards' work plan must show sufficient allowance of time in which to learn his territory, properly coordinated with maintenance of trails, telephone lines and other official work.

Regular guards will be paid on a monthly basis to conform to the standard wage scale set up for the region. Where subsistence supplies are furnished by the Government the monthly wage will be \$25 less than when the employee furnishes his own subsistence. Where regular guards are required to furnish saddle and pack stock, they will be paid \$5.00 per head per month more than they would be allowed if no horses were required. Saddle and pack stock must be of a type which will satisfactorily meet the requirements of the job. A contract of hire will be entered into with each regular guard showing the period of employment, rate of pay and number of saddle and pack stock required if any.

Whenever a smokechaser is located along a road, consideration will be given to whether chasing smoke can be speeded up by the use of a car, and if so, a car will be required. Regular mileage will be allowed.

Per diem guards will be paid by the day whether fighting fire or when held ready to go to a fire. The wage will conform with the standard wage scale for the Region as set by the R. O. and Forester's office. But if they are held 2 days or more on a fire, they will be paid regular fire fighter's wages during that period. In each case where per diem guards are sent to fires, a prompt follow-up by an experienced officer will be provided.

Fire Fund may be used to equip emergency guards where the Region cannot otherwise finance the equipment.

*Advance arrangements for meeting emergency conditions should be considered the most important part of the fire plan for any forest. It is during emergency conditions that we get the big losses.*

*Second Line Defense:* This will consist of road, trail, and other improvement crews, logging crews, sawmill crews, temporary fire fighters, and all

other labor from any source that can be utilized to advantage in fire control work. Since it is a basic principle that man power is only effective to the degree it is properly organized, supervised and led, it follows that every effort must be made prior to the opening of the fire season to have available a trained overhead sufficient to handle the number of men needed in the most extreme emergency. Leaders will be selected on the basis of past experience and mental and physical qualifications. Organized permanent crews, such as road crews, sawmill and logging crews, are most effective in suppression work. Logging, sawmill and other crews furnished by cooperators should be directed by their own foremen, provided they are qualified for such work.

There should be a written agreement (on form similar to Employment Contract found elsewhere in this handbook) with each man engaged in permanent improvement work in which will be set forth his obligation to assist in fire suppression, and the wages he will receive at that work. Contract forms will be kept on hand for this purpose. This will also apply to other men engaged in special work if available for fire suppression.

### CORRELATION OF ROAD AND TRAIL AND FIRE CONTROL ACTIVITIES

Road and trail men properly selected and placed can be of much value on areas of high hazard in fire control work. Consistent with efficiency in road and trail work, road and trail men on forests of high hazard should be selected for their value in fire control. It is desirable that they be of a caliber and with the experience to make good emergency guards or to replace regular guards; to make good fire fighters, and particularly to serve as straw-bosses and foremen in fire suppression work. Often, road and trail men will be the most available men for the second line defense. If they are properly selected and trained, they should be among the best men for fire suppression work. They should be particularly valuable in handling power equipment in building fire lines.

With reference to the road and trail projects which will be built during any season, the months they will be worked, and the number of men on each—plan to so place the road and trail men that they are of maximum help in fire control consistent with efficient accomplishment of road and trail work.

Road and other improvement crews should be selected and trained to the end that each man can fill an overhead position.

Fire suppression takes precedence over all road, trail and improvement activities. It will be the Supervisor's responsibility to get men selected for all improvement work who can also qualify for fire work, and to make such advance preparation as may be necessary to see that all improvement, road and trail crews are used on fire work when needed.

All members of improvement crews will be required to remain in camp on Sundays and holidays without pay during the fire season unless excused by the dispatcher. During emergency periods they may be held in camp on work days and one day of this time will be made up on the following Saturday if a holiday, if conditions justify. The crew may also wish to make



up additional lost time on Sunday which they may be allowed to do. In the event that it is not practical or desirable to allow the making up of time on Saturday and Sunday, the time lost on account of being held in camp during work days will be paid for from FF at the regular fire fighting wages on the basis of an 8 hour day.

### CENTRAL FIRE DISPATCHER

He will be employed on the principal fire forests, providing a fire dispatcher is considered good business. He may serve merely as a clearing house for information, as some clerks do, assuming no authority over district rangers; or he may be authorized to assume full authority in matters of fire control.

A fire dispatcher must have a good knowledge of the forest and be well versed and experienced in fire suppression practices if he is to be given full authority and function properly in a full degree as dispatcher. A capable Assistant Forest Supervisor or man of equal experience and ability may well be assigned as dispatcher on a fire forest with as many as 15 or 20 protective guards. On the fire forests with 15 or 20 or more protective guards, a fire dispatcher of experience and with authority is believed normally to be advisable; certainly so in very hazardous periods. He should keep in constant touch by phone with all the field men and keep fully informed on conditions, and should direct fire control work. Without a central dispatcher in bad fire periods, either some member of the overhead must keep close to the phone or each district ranger must practically act as dispatcher for his own district, if undue chances are not taken. A central dispatcher should greatly relieve both the Supervisor and the District Ranger, enabling them to get away from the phone, giving them more liberty in getting out over the forest and in attending to other work in addition to fire control work.

### THE FIRE DISPATCHER'S DUTIES AND RESPONSIBILITIES

#### *Responsibility*

He will be responsible to the Supervisor for all preparedness for and action on the fire control activities of his forest. He is the head of all detection and suppression forces, thus relieving the ranger and Supervisor for active field duty. The District Ranger is responsible for all fire control work on his district to the limit of his availability, time and capacity. When the District Ranger is absent from phone for any reason, the Dispatcher steps right in and assumes full responsibility for necessary immediate action.

There are different stages of dispatcher systems, different classes of dispatchers, and it is therefore necessary for each Supervisor in writing the dispatcher's instructions for his forest, to fully, completely and explicitly define the division of responsibility between the District Ranger and the Dispatcher. The District Ranger and the Dispatcher will be held responsible for action resulting from their decisions.

*Duties* (To be changed as necessary on each forest to suit local conditions.)

1. During the fire season the Dispatcher will be available for duty at all hours and must be in hearing of the telephone at all times. His work knows



no Sundays and no holidays, but the Supervisor will see that he is given necessary relief from his work so as to secure sufficient rest and recuperation.

2. The Dispatcher will keep a report, location and communication schedule either along the lines of the attached Report Schedule or some other more suitable form. A protective organization location map will be kept, showing the location of all members of the protective organization, crews, etc., by pins of different colors.

3. He will take necessary action to insure prompt and continuous telephone and radio communication, and when this is impaired, issue the necessary instructions covering the location and repair of the trouble. He will keep informed as to location of radio trouble shooters and direct their schedules.

4. He will receive and record reports of fires from lookouts, smoke-chasers and cooperators.

5. He will check with cross readings and obtain the most exact location possible of all fires and will plat them.

6. He will dispatch the first line defense. The individuals and number sent will depend upon the location and the size of the fire, burning conditions, etc. (Refer to Table 12 under Fire Studies.)

7. He will take action to insure any necessary follow-up both to fires and vacated guard points.

8. He will employ, put under contract of hire, and dispatch second line defense, equipped with overhead tools, plow-units and subsistence supplies. The primary responsibility in this respect will be with the District Ranger when he arrives on and assumes charge of any fire. But the Dispatcher must obtain the best information he can from all sources on men and equipment and supplies needed on the fire and he will act according to his best judgment in sending these to a fire.

9. He will receive messages and fill requisitions for men, tools, equipment and supplies on fires.

10. He will transmit the correct time to all protective guards daily.

11. He will keep daily record of all fires, on special form provided for that purpose. (Something similar to the old Dispatcher's sheet, if desired.)

12. He will endeavor to keep the protective force "pepped" up. He will keep competitive spirit and interest alive by reporting items of interest at report times, such as number and condition of fires discovered by other members of the organization and cooperators; number of first reports received in another's territory. Play strong on a friendly competitive enthusiasm.

13. He will see that adequate supplies of tools, equipment and provisions are on hand and properly distributed. He will see that incoming and outgoing tools are marked, counted, in proper condition and duly segregated.

14. He will determine when contributed time work can be done by the protective force, being careful not to materially weaken the organization for fire control. Such contributed time jobs will be in accordance with the

guard's plan, which has previously been prepared by the ranger and copies furnished to both the guard and the dispatcher. Where the District Ranger is available to the phone, he should be consulted relative to advisability and priority of such contributed time jobs.

15. He will decide as to when any member of the organization can get away from the phone for any purpose and for how long a period.

16. He will coordinate and shift rangers, road crews, etc., during emergencies.

17. He will decide upon the "sitting-tight" policy to be followed during periods of emergency.

18. He must be alive to the need for careful analysis of local conditions and be prepared when the need arises to call for outside assistance; for labor supply and overhead, for tools and equipment, etc., needed in emergencies.

19. He will see that weather records are kept, reports made to the Weather Bureau, and that forecasts are promptly sent to the protective force and men in charge of going fires.

20. He will take prompt initial action on Public Domain fires and those of other agencies, if forest is threatened, at the same time notifying the agency or R. O. of approximate location, size and probable cost of such fire, whether forest is or is not threatened. No action will be taken on Public Domain fires not threatening forest, except to report them, unless with CCC's, until authorized by Interior Department Agents. (See "Public Domain Fires \* \* \*")

21. He will check and see that the protective force is keeping lightning storm and other required records and making the necessary reports.

22. He will frequently inquire as to preparation for a prompt getaway (horses up, packs prepared, tools and rations segregated, etc.).

23. In deciding who and how many shall go to any fire, means of transportation, route of travel, etc., he will do everything possible to keep elapsed time to a minimum. In all cases where any item of elapsed time seems excessive, he will make full inquiry to determine the trouble and make immediate report to the Supervisor.

24. He will keep in closest possible touch with each fire by every method possible and will take prompt action in sending all men including overhead, provisions, tools and equipment that seem necessary.

25. He will make sufficient check to see that the force is reduced as fast as practicable when the fire has been put under control and that undue chances are not taken. Final decision will be made by the Fire Boss or Forest Supervisor on the ground.

26. He will keep the central fire records and diaries complete, full and up-to-date.

27. He will make the ten-day and other periodical fire reports and keep the Regional Office fully informed relative to the occurrence and progress of large fires and concerning their suppression.



28. He will notify the Supervisor when the humidity deficiency indicates the approach of an emergency period.

29. He will promptly inform the Supervisor and District Rangers of any items coming to his attention or shown by his records concerning the lack of efficiency of the suppression and detection forces.

30. He will check to see that ranger district organization charts have been prepared in sufficient detail and are available in Supervisor's and Rangers' offices. He will check the location of all available help daily.

31. He will be responsible for fire publicity in the press and daily news. He will see that due and suitable publicity is given in advance of any known influx of hunters, campers, fishermen, recreationists, etc.

32. He will see that vouchers and time slips are promptly submitted by the field.

33. He will check on the placement of emergency signs during emergency periods, and their removal when the emergency is past.

#### *Check List of Helps for Dispatcher*

##### Organization Charts:

Regular organization.

Men available for emergency guards.

Per diem guards.

Organized crews.

Sources of food supplies.

Packers

Foremen.

Cooks.

Laborers.

Transportation.

Equipment.

Law officers.

Protractor Map—With Strings For Each Point Equipped With Fire finder:

Colored and numbered pins for Class A, B, C, and burning fires.

##### Organization Map:

Colored and numbered pins to give location of all members of organization.

##### Communication Map:

Showing location of all telephone lines, location of telephone instruments and list of names of cooperators, radio sets, etc.

##### Transportation Map:

Showing all travel routes, roads, trails, ways, open ridges and portions of the forest where cross country travel with horses is possible at a speed of 1½ miles and up per hour.

##### Transportation Maps Showing Hour Control:

##### Hazard Maps in 3 Zones Showing Fuel Types:

##### Visibility Maps Covering Primary and Secondary Lookouts and Guard Patrol Points:



Azimuths From Lookouts:  
 State Forest Fire Laws:  
 Map Showing Occurrence of Lightning Fires Classified by Zones:  
 Map Showing Occurrence of Man-Caused Fires Classified by Zones:  
 Map Showing Occurrence of all Fires Classified by Zones:  
 Table to be used as guide in determining how many men to send to a fire.  
 Map showing occurrence of all rain storms during the season.  
 Table showing Regional overhead available for detail to fires.  
 List showing food supplies that may be purchased.  
 List of fire tools and equipment on forest and location and size of each unit. Amount available at Boise and Ogden; at Missoula and Spokane.  
 Regional fire control handbook and forest fire plan.

## REPORT SCHEDULE

Date.....	Dispatcher.....
Location of Forest Supervisor.....	
Location Forest Ranger Dist. No. 1.....	
Location Forest Ranger Dist. No. 2.....	
Location Forest Ranger Dist. No. 3.....	
Location Forest Ranger Dist. No. 4.....	
Location Forest Ranger Dist. No. 5.....	
Location Forest Ranger Dist. No. 6.....	
Location Forest Ranger Dist. No. 7.....	
Blue Nose.....	6 AM..... 12 Noon..... 5 PM..... *
Indianola.....	6 AM..... 12 Noon..... 5 PM..... *
Ulysses.....	6 AM..... 12 Noon..... 5 PM..... *
Grizzly.....	6 AM..... 12 Noon..... 5 PM..... *
Cove Creek.....	6 AM..... 12 Noon..... 5 PM..... *
Bear Trap.....	6 AM..... 12 Noon..... 5 PM..... *
Long Tom.....	6 AM..... 12 Noon..... 5 PM..... *
Skunk Camp.....	6 AM..... 12 Noon..... 5 PM..... *
Hughes Creek.....	6 AM..... 12 Noon..... 5 PM..... *
Stein Mtn.....	6 AM..... 12 Noon..... 5 PM..... *
Granite Mtn.....	6 AM..... 12 Noon..... 5 PM..... *
North Fork.....	6 AM..... 12 Noon..... 5 PM..... *
Lake Mtn.....	6 AM..... 12 Noon..... 5 PM..... *
Haystack.....	6 AM..... 12 Noon..... 5 PM..... *
Blackbird.....	6 AM..... 12 Noon..... 5 PM..... *
Sage Brush.....	6 AM..... 12 Noon..... 5 PM..... *
Taylor Mtn.....	6 AM..... 12 Noon..... 5 PM..... *
Red Rock.....	6 AM..... 12 Noon..... 5 PM..... *
Middle Fork Peak.....	6 AM..... 12 Noon..... 5 PM..... *
Two Point Peak.....	6 AM..... 12 Noon..... 5 PM..... *
Duck Creek.....	6 AM..... 12 Noon..... 5 PM..... *
Telephone Crew.....	6 AM..... 12 Noon..... 5 PM..... *
Trail Crew.....	6 AM..... 12 Noon..... 5 PM..... *
Road Crews.....	6 AM..... 12 Noon..... 5 PM..... *
Packer.....	6 AM..... 12 Noon..... 5 PM..... *

Year	1990	1991	1992	1993	1994
1	100	100	100	100	100
2	100	100	100	100	100
3	100	100	100	100	100
4	100	100	100	100	100
5	100	100	100	100	100
6	100	100	100	100	100
7	100	100	100	100	100
8	100	100	100	100	100
9	100	100	100	100	100
10	100	100	100	100	100
11	100	100	100	100	100
12	100	100	100	100	100
13	100	100	100	100	100
14	100	100	100	100	100
15	100	100	100	100	100
16	100	100	100	100	100
17	100	100	100	100	100
18	100	100	100	100	100
19	100	100	100	100	100
20	100	100	100	100	100
21	100	100	100	100	100
22	100	100	100	100	100
23	100	100	100	100	100
24	100	100	100	100	100
25	100	100	100	100	100
26	100	100	100	100	100
27	100	100	100	100	100
28	100	100	100	100	100
29	100	100	100	100	100
30	100	100	100	100	100
31	100	100	100	100	100
32	100	100	100	100	100
33	100	100	100	100	100
34	100	100	100	100	100
35	100	100	100	100	100
36	100	100	100	100	100
37	100	100	100	100	100
38	100	100	100	100	100
39	100	100	100	100	100
40	100	100	100	100	100
41	100	100	100	100	100
42	100	100	100	100	100
43	100	100	100	100	100
44	100	100	100	100	100
45	100	100	100	100	100
46	100	100	100	100	100
47	100	100	100	100	100
48	100	100	100	100	100
49	100	100	100	100	100
50	100	100	100	100	100
51	100	100	100	100	100
52	100	100	100	100	100
53	100	100	100	100	100
54	100	100	100	100	100
55	100	100	100	100	100
56	100	100	100	100	100
57	100	100	100	100	100
58	100	100	100	100	100
59	100	100	100	100	100
60	100	100	100	100	100
61	100	100	100	100	100
62	100	100	100	100	100
63	100	100	100	100	100
64	100	100	100	100	100
65	100	100	100	100	100
66	100	100	100	100	100
67	100	100	100	100	100

## Responsibility

The District Ranger will be held responsible for the efficient handling of all fire control work on his district unless specifically relieved of responsibility for a specific fire or other specific fire control job by his superior officer.

The District Ranger is responsible for maintaining the detection improvement system and equipment to the accepted standard, and each and every part will be inspected and brought up to standard before the beginning of each fire season.

The District Ranger will keep in as close communication as possible with his protection organization without undue interference with his other administrative duties. Travel in remote regions where telephone communication is not available should be performed insofar as possible before and after the period of high hazard, unless radio communication can be maintained regularly.

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to act in his absence. This restriction *does not* apply to the employment of fire-fighters. During a period of abnormal danger within the fire season, emergency guards may be hired to supplement the regular force when advance permission has been given. The District Ranger will be responsible for notifying the Supervisor or Dispatcher of emergency conditions on his district. District Rangers will dismiss immediately short-term men guilty of gross negligence or insubordination. In cases of less importance, conference with the Supervisor will be had before final action is taken.

During the fire season forest officers will be given permission to leave their districts only in cases of extreme emergency and after taking the case up in advance. On high hazard districts, they will be expected to remain on the phone Sundays and holidays unless on duty in the field.

The District Ranger will be responsible for full cooperation with adjoining forest organizations and other fire control organizations in accordance with agreements entered into with such organizations and which are made a part of the fire plan for the forest. He will be responsible for the satisfactory handling of all fire control improvement work, both maintenance and construction, on his district, unless relieved by the Supervisor in any specific case. He will take an active part in the group training of guards and fire overhead and will continue training of guards under his supervision at every opportunity throughout the fire season. He will be held responsible for the proper mounting of alidades at lookout points, training and instructing lookouts and preparation of lightning storm reports and other weather records, diaries, etc. Organization charts must be completed and furnished the Supervisor prior to the opening of the fire season.

District Rangers will see that the time of the protective force is employed on improvement work as outlined in their improvement plans, to the fullest extent consistent with fire control. Instructions in writing must be furnished each guard, explaining in detail just what jobs he is expected to do, when he should work on improvement jobs and when stay at his telephone, miles of telephone line he should keep up, cleaning protector blocks, cleaning up around camp, etc. It is important that all guards who may have to chase smoke and fight fires be always in fine physical shape and capable of strenuous exertion. They must do sufficient work during the season to keep them all the time in fine physical shape.

The District Ranger will be responsible for maximum use of per diem guards and all available cooperators. Per diem guards should be furnished a memorandum or letter signed by the Ranger and stating in brief, clear-cut terms just what they are expected to do and what we will do in the matter of wages, etc. They will be required to receipt for the tools and equipment furnished them.

The District Ranger will be responsible for inspection of the protection organization as frequently and as thoroughly as required by the inspection schedule set up for the district. He will be responsible for providing adequate follow-up for all fires on his district except where dispatcher is given this responsibility. He must plan definitely for his first and second-line de-



fense, including transportation, etc. This will be shown on his organization chart insofar as possible and supplemented where necessary.

The responsibility of law enforcement rests squarely upon the local forest organization. District Rangers will be responsible for initiating action in all cases on their districts and will cooperate with other districts to the fullest extent possible.

On medium and low hazard forests the District Ranger will go immediately to each uncontrolled fire on his Ranger District, except when relieved by the Supervisor, or his services are urgently needed on other going fires. This does not contemplate Ranger remaining at headquarters and neglecting important resource supervision and inspection. On high hazard forests the action of the Ranger will be governed by instructions from the dispatcher or Forest Supervisor.

Before each fire season the Forest Supervisor will furnish complete written instructions to each District Ranger, covering that Ranger's duty in case of more than one fire on his district at any one time. Specific emphasis will be placed in these instructions on the Ranger's duty while on a going fire, where there is more than one fire on the district.

The Ranger must have a thorough knowledge of the Fire Handbook and see that all of its provisions are observed by every man under his supervision.

The Ranger will not be excused for failure of his guards unless he has taken every practical step by telephone, personal inspection or otherwise to prevent any failure.

Unless specifically relieved by the Supervisor, the Ranger must give attention to all fires on his district and when more than one fire is burning at the same time he must not stay on one fire to the neglect of other fires; likewise, he must not stay on any particular section of one fire to the neglect of other sections needing attention. He shall direct others in fighting fires rather than doing the actual fighting himself when a number of fire fighters are engaged. This applies to all overhead on fires.

On the seven fire forests, the Ranger will be expected to contact his organization and the Supervisor's office by telephone or radio, after the occurrence of lightning storms in periods of medium or high hazard.

## GENERAL INSTRUCTIONS TO GUARDS, IMPROVEMENT CREWS, LOOKOUTS AND SMOKECHASERS

There is much in common in fire control work on most ranger districts that can be covered by general instructions to all short-term men on all fire forests. These general instructions should be supplemented by such special instructions as are deemed necessary to meet local conditions. Each man will be furnished both the general and special instructions, to cover not only fire control work but any other duties assigned him. No exception whatever will be made in furnishing these written instructions and insisting that they be studied and understood. Since other sections of this handbook cover things to be done by the protective organization, each man shall become familiar with all pertinent sections of the handbook, as well as these instructions.

## *Purpose*

Protection guards are employed primarily for the prevention and suppression of forest fires. They will work under the immediate direction of the district ranger or dispatcher and are responsible to both for satisfactory service.

## *Sanitation*

The following rules of sanitation will be strictly observed by all members of the protection organization:

1. When authorized by the ranger in charge, pile and burn all refuse around camp that can be disposed of in this way.

2. All refuse which cannot be burned will be placed in a pit, equipped with a fly-proof cover. At temporary camps where fly-proof covers for pits are not justified, dig the pit and cover refuse with dirt each day. All pits will be located a sufficient distance from water supply to prevent contamination. All pits will be located at least 100 feet from camp and in an obscure place. They will be sprinkled frequently with dirt or ashes, with an occasional application of chloride of lime.

Permanent toilets will be made fly-proof. Temporary toilets as a general rule need not be fly-proof, but in that event they will be sprinkled frequently with dirt or ashes. All toilets will be occasionally sprinkled with chloride of lime, crude oil, or germicide. Toilets will be located at least 100 feet from camp and where there is no danger of contaminating the water supply.

4. Keep all camps in a neat, orderly and sanitary condition by:

- (a) Maintaining a clean supply of face and dish towels on hand at all times.
- (b) Shaking and airing bedding at least twice each week.
- (c) Washing all dishes and cooking utensils thoroughly after use.
- (d) Keeping personal effects clean and orderly.
- (e) Keeping cabins and tents clean and sanitary and subsistence supplies carefully stored and protected from weather, flies and rodents.

## *Diaries*

Each man will keep a diary in a form approved by the Forest Supervisor. Entries will be made daily and the record kept up to date. Diaries will be checked by ranger who will prepare Forms 26 for his guards.

## *Tools and Equipment (Mandatory)*

All tools and equipment will be charged directly to the individual and he will be held strictly accountable for any losses. Articles broken, damaged or lost should be reported to the ranger, with complete explanation.

Tools and equipment must be kept in first-class condition at all times. Racks should be provided to take care of tools not in actual use. Fire tools must not be used for any purpose other than fire control work.

Tents, flies, water bags, knapsacks, and other canvas goods should be



handled and packed in such a way as to avoid injury by contact with sharp-edged tools or otherwise. They must be protected from rodents.

At the close of the field season all employees will be expected to leave their entire equipment in first-class shape. All cooking utensils that have come in contact with fire should be thoroughly scoured inside and out and all metal dishes subject to rust should be washed, dried and oiled with a light coating of mineral oil or unsalted lard.

At camps with permanent structures where stoves are stored, the stove and stovepipe will be oiled, or greased with fresh lard. The stovepipe will be taken down and the stove moved from a direct line with stovepipe hole. Stovepipe jack will be covered, preferably with an empty lard bucket placed over it. Where mattresses, bedding, canvas goods, map boards, etc., are left in the building, they will be suspended so rodents cannot injure or destroy them. At stations that have any plumbing all pipes will be drained and traps and goose-necks will be treated with salt to prevent freezing.

#### *Fireman's Packs (Mandatory)*

Fireman's packs will be provided at all camps and must be kept packed, in first-class condition, and ready for immediate use. This will be so arranged that if man goes on foot, back pack can be immediately segregated for prompt getaway. Under no circumstances will their use be permissible for purposes other than fire control. These packs shall include two days' rations in addition to the standard outfit of tools and equipment. Each member of the protective organization shall have standard fire outfit of tools and equipment with him when away from his station unless excused by the ranger or dispatcher.

#### *Care of Automobile*

Where protective employees are required to furnish automobiles for transportation, these cars must be kept in condition for immediate use. They must be equipped with good tires, tire repair kit, an ample supply of gas and oil, and have lights and brakes in good working order. There should be a spare tire.

#### *Subsistence Supplies*

Where protective employees furnish their own subsistence they will be required to start the season with supplies sufficient to last thirty days and must have on hand at all times up to August 25, supplies sufficient for at least fifteen days. This same standard will be followed where supplies are furnished by the Government and packed in by Government pack stock. Exception will be made for those locations along roads and immediately accessible to supply trucks. At these locations a supply for a week may be sufficient.

Good judgment and economy must be practiced in the use of supplies and every effort made to avoid waste. Orders for replacements should be given at least a week in advance of the actual need. Keep a current want list of things needed and avoid overlooking anything when ordering supplies. Special trips cannot be made to supply articles overlooked.



When leaving camp for any length of time, food supplies left in camp should be well protected from insects, rodents and other animals. Personal supplies furnished to fire fighters will be replaced by the Government as soon as possible.

### *Mail*

All mail will be held at headquarters until it can be sent to addressee. Under no circumstances will employees be allowed to come down for mail or supplies except under specific authority granted by the fire dispatcher, nor will special trips be made for the purpose of delivering mail.

### *Getting Acquainted with Unit*

Before the beginning of the fire season each guard must acquire a thorough knowledge of his unit. He should be sufficiently familiar with all roads, trails, ways and other routes of travel to insure his getting to a fire on any part of the unit by day or by night with a minimum of elapsed time. Much of this knowledge can be acquired while maintaining trails and telephone lines prior to the opening of the fire season. Where this is insufficient, special trips over the unit should be made.

### *Reports*

Protective employees will be furnished with smokechaser's report forms and the lookouts with a lookout report form in addition. One of these forms must be filled out for every fire that guards work on or report. Fill out these forms carefully. Answer each question or check it off if it does not apply. These reports are of great value when kept for a period of years in answering many technical and administrative questions in the fire game. Send reports to the district ranger.

Take care to report all fires, even unextinguished camp fires that have done no damage, in order that records may be complete. If you know of fires that have been discovered and suppressed by private individuals, you should collect the data called for and make a report in the usual manner. Collect and record the data for the report while you are on the ground instead of trying to remember after you get back to camp.

### *Smoking by Forest Service Employees*

Because of the numerous forest fires which are started every year by smokers, the Forest Service has been forced to adopt a "No Smoking" policy, and forest employees must set a good example to the general public in this respect. Therefore, during the fire season smoking will be allowed only at improved camp grounds, permanent stations, or in other safe places. Under no circumstances will smoking be allowed while in motion in traveling through forested areas or areas with inflammable ground cover.

Smokers' fires have also originated with fire crews going to or returning from project fires. The contracts of hire for fire fighters will be stamped to the effect that members of a fire crew may, in the discretion of the fire boss, be prohibited from having matches.

### *Law Enforcement*

The reduction of the number of man-caused fires is one of the principal

objects of any forest organization. Strict enforcement of the fire laws must be obtained in order to accomplish this result. The willful setting of fires or leaving camp or other fires unattended is punishable under both state and federal laws. Every man-caused fire, therefore, involves the duty of determining the identity of the person who caused the fire.

Protective employees should determine the cause of origin of all fires to which they go and if not obviously a lightning fire, determine the point of origin, how it was set and if possible, by whom. Collect any bits of evidence obtainable, note tracks and anything which will give a clue to the offender. Report findings to the district ranger or fire dispatcher, who will take the necessary action. Temporary employees and guards are not authorized to make arrests without specific instructions.

Temporary employees and guards are also not authorized to make arrests under the State Game Laws. The Forest Service is, however, pledged to a policy of cooperation with the State in the enforcement of the game laws and all district rangers are deputy state game wardens. All violations of the game laws which come to the notice of guards should be reported to the district ranger or fire dispatcher.

### *Tourists and Campers*

Treat all tourists, campers or hunters courteously and give them all possible assistance and information. Avoid appearance of officiousness. They have a right to the use of the recreational resources of the forests and should be welcomed.

If their fire is too big or is built against a tree or log, explain the dangers to them and the great majority will meet you halfway. It takes tact and consideration to handle many of them, but we must remember that they are our guests to a certain extent and are entitled to all the aid that we can give them. However, do not allow them to impose on your good nature and other duties. Above all do not tolerate any lawlessness on the part of any camper. The protective force should gather information such as names, auto license plate numbers, etc., of every visitor contacted or seen.

If you can keep in touch with the campers on your unit, it may save a lot of fire fighting.

During periods of special restrictions or after the issuance of closing orders on the forest, protective men will be specifically advised by the Supervisor as to their additional duties.

### *Use of Telephone*

Listening in or eavesdropping on telephones will not be permitted or tolerated; first because it reduces the efficiency of the service; and second because of the ethics of such action. Taking down a receiver is equivalent to adding a load equal to six miles or more of line, and when several receivers are down it often makes it difficult or impossible to use the line. Visiting on the phone will be confined to evenings when line is not in use for transmission of official business. Answer your rings promptly and make your rings distinct when calling others and thus help promote efficiency.



### *Get-Away (Mandatory)*

The standard time allowance for get-away is five minutes for foot or automobile travel and fifteen minutes where horses are used. Since control of the fire may be contingent upon a few minutes saved in reaching it, the importance of prompt discovery and quick get-away cannot be over-emphasized. As soon as you are ready to go, report to the ranger or dispatcher, but do not delay if you cannot get one of them readily.

### *Travel (Mandatory)*

Where horses are required they will be brought in each morning by 8:00 a.m. during the fire season and held in readiness for immediate use. They will be kept up until sundown. Have them properly shod at all times. (Refer to "Saddle and Pack Stock" section, elsewhere in these instructions.)

Reach your fire by the quickest method. If you can save time by foot travel, do not bother with horses. Take your tools and emergency rations and go.

Overnight fires will not be recognized. Night travel is standard practice. Where fires are reported in the evening or during the night, an immediate start will be made and as much of the distance to the fire covered during the night as is reasonably possible. Any loss of time incident to slower night travel is usually much more than offset by the advantage gained in being on the ground at daylight and hitting the fire before the next burning period. You will be furnished a suitable light for night travel which will be kept ready for immediate use.

### *Stay With Your Fire (Mandatory)*

The first man to reach a fire should stay and endeavor to put it out. Do not size up your fire and decide that it is too big for you to handle alone and return for help. Stay with it and do the best you can.

Many fires have gotten away because the first man to arrive became discouraged too soon, often by reason of the fact that fires are apt to appear more serious in the middle of the afternoon than a few hours later. There will be systematic follow-up by the dispatcher while you are on the fire. Lookouts will be instructed to report in at frequent intervals the condition of your fire as judged by the smoke, and reinforcements will be sent when they appear necessary. In case you do not report in that the fire is out within 48 hours, additional help will be sent out. You should not leave your fire until it is out, nor should you place someone else in charge unless you are more urgently needed on another fire. Always be sure your fire is dead or well buried before you leave. Do not think that all danger is over just because the fire has ceased to be active, but stay until you have put out the last spark, or the fire is safely buried in mineral soil.

### *Automobiles for Smokechasers*

Fire guards on roads will be required to furnish cars for official use, provided their efficiency as smokechasers will be materially increased thereby. They will be paid the regular mileage rate for official use of auto. The required mileage will be estimated separately from the wages in preparing al-



lotment sheets. In no case can a higher salary be paid to cover mileage for official use of car. Where autos are used for chasing smoke, such preparation will be made that a five-minute get-away will be practical. All personal autos used for chasing smoke will be placed under regular contract of hire.

### *Saddle and Pack Stock*

Where protective guards are required to furnish saddle and pack stock, care must be taken to see that the animals furnished are well broken and the best obtainable for the purpose. This is not a job on which horses may be broken. All animals accepted for use will be carefully examined, appraised, and covered by regular contract of hire by the forest officer having direct supervision of their work. This will ordinarily be the district ranger.

Everyone furnishing saddle and pack animals whose duty in whole or in part is to chase smoke, must have all practical advance preparation made for the quickest possible get-away. When the fire hazard is sufficiently high to justify the guard staying on the phone, within hearing of the phone, or reporting in at frequent intervals, horses will be brought in and tied up not later than 8:00 a.m. each day, and will not be turned out again before sundown. In no case will they be allowed to run loose in an enclosure or elsewhere if more than five minutes will be required to catch and get them in. It is generally best to keep them tied up with saddles on, loosely cinched.

A list showing exactly what will be kept in the packs ready to go must be furnished each smokechaser and a copy of the list posted at the packs for ready reference in checking contents.

With all practical advance preparation made, it should not require more than fifteen minutes for the get-away where travel is by saddle and pack animals, between 8:00 a.m. and sundown.

### *Foot Travel*

A five-minute get-away where travel is on foot is practical. Packs will be maintained in constant readiness and lists covering contents posted as in the case of horse travel. A Kapok bed weighs from 10 to 14 pounds, and it will not be taken when travel is on foot. Even when travel is by horse, bed will not be taken unless fire dispatcher instructs otherwise.

### *Lightning Storms*

As a rule lightning storms can be seen when they are a considerable distance away. All guards and lookouts must watch for and report to the dispatcher, or ranger where no central dispatcher is employed, the approach of lightning storms. If away from the phone during the occurrence of a lightning storm, or when one threatens, guards, lookouts and smokechasers will return to the phone and report in immediately.

When a storm passes over a particular area there will be some strikes that will start fires immediately, others may flare up and die down, while still others may not even flare up or show any smoke for several days. These "hang-over" fires are very dangerous, since they invariably break out after any beneficial result from accompanying rain has passed. These hang-over

fires must be discovered as soon as possible. Diligent watch will be kept of areas where strikes have occurred, and in some instances guards will be required to make patrol trips to the vicinity of lightning strikes to search for possible fires.

### *Personal Appearance*

Since many members of the protective force contact the visiting public, a reasonably high standard of dress and personal appearance will be required.

Shoes and work clothes suitable to the rough nature of the work necessary will be required and for those of the personnel who contact a large number of visitors, types of field clothes may be specified by the Forest Supervisor. They should be worn at least while at the station.

### *Additional Instructions to Lookouts*

The lookout man will be directly responsible for the detection of all fires within the area controlled by his vision, and to supply additional information upon any fire or fires within the area.

Each employee stationed at a lookout or other point where observations can and should be made will be required to keep a constant lookout for fires. This will be done not less frequently than at fifteen minute intervals, by carefully and systematically scanning the surrounding country, beginning at some definite point and slowly working around until that point is again reached (mandatory). Do not use your field glasses when looking for fires. The field of vision is small and much of the country may be missed. When you have spotted a fire or what you believe to be a fire, use your field glasses to get the best information possible.

Get your water and fuel before 8:00 a.m., soon after you have taken a good look over the region. From 8:00 a.m. you will remain on the lookout. Keep a good supply of fuel on hand.

(Mandatory) While on lookout duty, every man will devote his entire time and attention to the detection of fires. *No parties, card playing, or undue visiting will be allowed during daylight hours.*

(Mandatory) Lookout men will under no circumstances leave their stations without advance instructions from the district ranger or fire dispatcher. (Going to fire when communication is out, being the only exception.)

Lookout men while on lookout duty will immediately report to district ranger or fire dispatcher any change in spread of a going fire. They will also report to the dispatcher the number, location, and action of all spot fires seen. Lookouts will make every effort possible to locate and report spot fires—searching the country on uphill, leeward side and head of going fires for spot fire smokes. This is important. After a fire is on a patrol basis, and for several days after the last fire-fighter has left the fire as out, all lookouts within the range of vision, will keep constant watch for and immediately report to fire dispatcher (or district ranger) any smokes showing up.

Forests will establish a certain degree of efficiency for guard and lookout performance, which must be met by all guards and lookouts to be eligi-



ble for reemployment and promotion. They will be judged on first discoveries reported, get-away time, travel time, success in controlling fires, general preparedness at all times checked, knowledge of guard and lookout instructions in this handbook, efficiency on any jobs given them, etc. All men who can satisfactorily meet the required standard will be eligible for reemployment and most of those reemployed will be eligible for promotion. Those who do not measure up will be dropped.

All short-term men must have a thorough knowledge of this handbook, with particular emphasis on instructions to the protective organization, fire suppression instructions, and the part pertaining to small fires and the initial action on other fires.

#### *Assistant Lookout Policy*

Assistant lookouts may be employed *only for such periods as the lookout is absent chasing smoke or fighting fires*. Payment for such assistant lookouts will be made from F. F.

#### *Detection*

Put smokechasers where they can be of most value as lookouts.

An objective for which all must strive in fire control is the minimum of elapsed time from the inception of the fire to the arrival of the first man on it prepared for suppression work. The records for the region show that discovery time is relatively high. If we are to reduce elapsed time very much it will have to be done largely by cutting down discovery time. Consult your fire records and note the long discovery time for many of your fires.

Therefore, we must make the most careful study to see whether we can not place our protective guards, particularly our smokechasers, to better advantage so as to reduce total elapsed time. It may be a certain smokechaser is properly located for chasing smoke; that as to travel time he has the best possible location, but by placing him where he can be of more value as a lookout his total elapsed time can be reduced. The most important thing is *total* elapsed time, granting that a change of location for a smokechaser increases travel time to fires on the average an hour. If it cuts down discovery time by two hours on the average, and other things are equal, then total elapsed time has been reduced one hour and the change should be made. There doubtless has been too much of a tendency in some cases to try to get a nice site as headquarters for the smokechaser and to give too little attention to the question of whether the location is such as will on the average reduce total elapsed time to the minimum. We should not be so greatly influenced by living conditions as to fail to choose the site that will give us the best results in protection.

It is the Regional policy to make the fullest possible use for detection purposes of *all* paid protection members of the organization, by reconsidering present placements and relocating the maximum number of low-country men on points where they can add to the detection system of the unit.

As between detection, smokechasing, and supervision of the public, the dominant character of the service required within a unit and the correct

placement to produce that service can be brought out by an analysis of visibility maps, location of fires, causes of fires, past fire control records, and the entire fire situation on the unit. Such an analysis should be made immediately in all cases of doubt.

Lookouts and lookout smokechasers will be required to live on their lookout points. It is poor practice to allow protection men to live a short distance under their lookout point, purely as a matter of convenience, and no approval will be given for the construction of living quarters for lookouts at any point other than the top of the point used for observation, or which should be so used, if that is known. In case of doubt whether a location is the proper one, spend no more money improving it. We can easily use all available funds for some years to come on projects we are sure we will need.

Permanent primary lookout structures will be constructed only after accurate visibility maps showing percentage of seen and unseen areas have demonstrated the exact location and necessary height of the structure.

Lookout observatories will be of the type accepted as standard for the forest and region.

Each observatory will be equipped with:

1. Range-finding apparatus.
2. Map board and map.
3. Telephone (preferably desk set).
4. Stool and chair.
5. Amber glasses.
6. Case containing forms, notebooks, pencils, etc.
7. Weather observing apparatus (where required).
8. Written instructions.
9. Telephone directory.
10. Copy of Fire handbook
11. Bed and bedding.
12. Dining table.
13. Cookstove.
14. Cooking utensils.
15. One-man outfit of suppression tools and equipment.
16. Three-day emergency rations.
17. Telephone equipment, including pliers, connectors, emergency wire, insulators and brackets, climbers, staples and spikes, and fuse blocks.
18. Axe and shovel for use at lookout and elsewhere on improvement work.
19. Water barrel and bucket for fire protection.
20. Broom.
21. Ladder.
22. Alarm clock.

Secondary lookout structures may comprise towers, platforms in trees, or high rock points. These will be utilized during periods of abnormal hazard



or low visibility to supplement detection service from primary lookouts. Wherever it is necessary they will be equipped with fire-finding apparatus.

As soon as the necessary studies are completed and approved the forests must lose no time in taking prompt action to make whatever shifts of guard stations are necessary to accomplish the end of minimum total elapsed time, considering the number of guards available for fire control work. There will be no hesitation in abandoning the improvements existing at present sites and in changing the location of guards where material betterment can be made in total elapsed time by so doing.

The detection system will utilize every detection agency available to bring as high a percentage of the protected area under direct visibility as practicable. These agencies are:

Forest Service primary lookouts.

Forest Service secondary lookouts.

Forest Service patrolmen.

Timber Protective Association lookouts and patrolmen.

Per diem guards.

Permittees.

Campers.

Motorists.

Stage drivers.

Aircraft.

## COMMUNICATION

Dependable communication facilities are necessary for effective fire control.

Telephone lines must be maintained and in serviceable shape before the opening of the fire season.

All regular guards will be provided with telephone or radio facilities. This work will be considered of highest priority in estimating for and in the allotment of improvement funds. When Emergency Guard plans are completed and approved by the Regional Forester, communication to emergency points will be financed as promptly as funds can be made available.

Use of the following maximum percentages of time to be paid from S. & E. or F. F. in obtaining communication will be permissible on higher hazard areas during the more dangerous periods in order to make men the more available for fire suppression.

During normal periods—1% to be paid from S. & E.

During emergency periods—4% to be paid from F. F.

In addition to this, a maximum of 1% may be paid from R. & T. or other project funds in order to facilitate R. & T. or other work.

In seasons better than normal there will be no S. & E. or F. F. expenditures in order to keep improvement camps connected with phones for fire suppression purposes.

In a normal season, for example, if there are 8 men in camp available

for fire fighting and they will camp in a certain place 10 days, we have 80 man days. One percent of this is .8 man days, which is allowable as an S. & E. charge. Adding to this an equal amount from R. & T. funds to facilitate the improvement work makes a maximum of 1.6 man days, which may be spent to establish telephone communication with the camp. For an emergency period this may be increased to a maximum of 4 days.

The figures of 1 percent S. & E. for normal periods and 4 percent F. F. for emergency periods refer to labor only. Materials and equipment will be in addition.

Proper planning for such a communication system is the responsibility of the Supervisor, and no fire plan is complete without a definite program to meet the need for all emergency tie-ups. But see "Radio" below.

### *Summoning Improvement Crews to Camp*

Improvement and other crews are an important part of our fire control organization. Arrangements must be made to get them started to fires in the minimum elapsed time. Steps should be taken to make it possible to call them to camp from their work on improvements, etc., promptly. Every camp having a cook should make some arrangements for calling crews to camp promptly (sirens, discharge of firearms, bugle calls, etc.). In the case of road crews, it may be desirable to run the telephone line ahead from camp to the point where the men are working and to install a phone there.

### *Testing Telephone Lines*

During the fire season on the main fire forests at least three test calls a day will be made to the phone of every member of the protection organization. Daily, at prearranged hours, all fire control personnel not specifically excused will be at their phones and the dispatcher, district ranger, clerk, or other properly qualified forest officer will call each in turn. This will establish the working order of the communication system, and give an opportunity for issuing special instructions for the day. This also gives a splendid opportunity to keep men on their toes and for supplemental inspectional follow-up of the stage of preparedness at each point.

Any failure to get satisfactory service over the line will call for immediate investigation and repair by the party responsible for the portion of the line out of commission.

Following is a check list of things to look for in case of trouble:

1. Lightning arrester—blocks clean.
2. Open switch.
3. Terminals loose outside.
4. Ground rod dry.
5. Battery connections loose.
6. Loose connections inside box.
7. Batteries weak (you can hear, but other party cannot hear you—try talking through receiver and put in new batteries).
8. Open line, broken, etc.—crank turns too easily.
9. Grounded or shorted line—crank turns too hard.



10. In nine cases out of ten, the trouble is out on the line.
11. Only experienced telephone instrument men should attempt to repair the inside of telephones, except as noted above.

### *Emergency Repairs*

Advance plans, usually incorporated in guard and lookout instructions, will be made for dividing the telephone system into sections for prompt maintenance and repair. Each member of the protective organization will have written plans, instructions and training as to boundary limits of his section, line repair, etc.

The responsibility for maintenance of the telephone system to attainable standards rests with the district ranger.

### *Regular Officers on Phone*

Each fire plan will make provisions for regularity of reports of guard, ranger, and supervisor at phone. During periods of high hazard, the Supervisor or fire dispatcher will determine the permissible length of absence from telephone.

When not in telephone communication, it is good practice to have at least one member of trail and other crews report at a telephone immediately after lightning storms in high hazard areas. This will be a standard practice during periods and in areas of high hazard. If a different standard is desired, the district ranger or supervisor will issue specific instructions.

In areas of high hazard, the use of small PF radio sets is approved. Such sets will be supplied as fast as funds are available.

### *Radio*

Radio has proved very satisfactory in Region 4, except for static, interference, and because of lack of ringing or calling facilities (at outlying points).

Consistent with additional development of radio sets and as funds become available, the Regional Forester will purchase and make distribution of additional sets in sufficient numbers to equip all improvement crews and emergency stations with radio, unless it is clearly evident that telephone connections with existing lines will be cheaper. Small radio sets are very valuable on going fires, at isolated detection points and isolated crew locations.

M sets will be kept to a minimum, particularly when used with generator.

Twenty-four-hour stand-by radio service should be provided at dispatcher's headquarters during Periods 4 and 5.

The Regional Forester will consider the rental-storage and purchase plan for small radio sets. (Similar to power pump arrangements in the past.)

## TRANSPORTATION

### *Trucks and Other Automotive Equipment*

The primary means of transporting men and supplies to fires will probably continue to be by automotive equipment. This will probably continue to be the most economical and time-saving method where roads and motor-

ways are available. Where this equipment is used, load capacity and speed in transit are obviously the two major factors. With our present standards of construction on light duty roads and auto ways, the most economical truck for heavy forest use is a six-cylinder, two-ton truck not to exceed 170-inch wheel base, with single tread over-sized tires, same size front and rear. Larger trucks may be used where road conditions allow economy and speed of operation. On these and on the two-ton trucks dual wheels may be used if road conditions allow.

### *Hire of Trucks*

Where it is practical to determine approximate weight of loads hauled, a ton-mile basis is desirable. Where this is not practical, a straight mileage or day basis will be used. The mileage basis will probably have to be the rule.

A light duty truck of  $\frac{3}{4}$ -ton capacity or less for use in maintenance of telephone lines and other fire control improvements, distribution of fire tools and equipment, etc., is a real need on each ranger district on fire forests where there is a sufficient mileage of roads and motorways.

### *Airplanes*

Although the purchase of aircraft at this time is not contemplated, each bad fire forest should give more consideration to the use of this equipment. The use of airplanes for transporting men and supplies to fires in remote regions has passed the experimental stage and in some cases has proved more economical than other means of transportation. Where men and supplies can be transported by air to going fires with a material saving in time this method will be used. Contracts covering rates to be charged and tonnage to be hauled will be entered into in advance.

On forests where the use of aircraft is practical, development of the following aids in air travel will be given careful consideration:

1. Better marking and improvement of existing landing fields.
2. Selection and development of additional landing fields.
3. Numbering or otherwise marking lookout structures and other objects for use as landmarks in air travel. Merely suggestive and where needed, instructions will be obtained from the Department of Commerce for standard marking rules and regulations.

When urgently needed on going fires and where a material saving in time can be made, it will be the policy wherever practical to transport overhead from the Regional Office or the low hazard forests to the fire forests by plane. Landing fields are now available at every Supervisor's headquarters on the seven principal fire forests. There are ten landing fields within these seven forests.

## IMPROVEMENTS

Extreme care must be taken in starting protective improvement projects which may become obsolete as a result of fire studies.

### *Landing Fields*

Supervisors of the fire forests will make a survey or reconnaissance to



determine the location of such landing fields as are thought necessary for fire control. These should be indicated on a 1/4" map and classified as (a) used at present, (b) contemplated. This map should then be submitted to the Regional Office. Fields both on and near the forest should be shown.

More landing fields are needed in the fire forests in parts most remote from labor supply, even though close to secondary roads, in order to reduce elapsed time for first follow-up.

#### *Lookout Towers*

In the interest of safety and permanency all lookout towers over 20 ft. in height will be of steel unless the use of timber is of outstanding economy.

14 ft. x 14 ft. standard living quarters will be constructed on the top of towers of 40 ft. height or under. Where tower is over 40 ft. high, living quarters will be placed on the ground adjacent to the tower.

#### *Lookout Buildings*

R-1 ready cut type is now standard, and will be used unless transportation and other costs are excessive in remote areas.

Prior to approval of allotments for lookout buildings, sufficient visibility, occurrence and hazard studies should be completed to assure permanency of the use of that particular point. A survey will be made of the location, giving full consideration to topography, tree growth, and other factors affecting the height of the tower needed, if any, and giving full consideration to all other supplementary improvements.

#### *Toilets*

Toilets should be constructed at each lookout or smokechaser point. All future construction will conform to the standard R-4 plan.

#### *Fly Sheds*

Where horses are required for lookouts and smokechasers, a fly shed will be constructed if needed to protect the horses that are kept up during the day time for quick get-away to fires. This is another contributed time job that may be considered in fire guard work plans.

#### *Water Supply*

Deficient water supply for lookouts and smokechasers may be developed by reservoiring or by other means, and protected by fencing where needed.

#### *Firebreaks*

No firebreaks will be constructed in R-4 except upon clear showing of an outstanding need.

#### *Pasture Fences*

As fast as funds and higher priority protective improvement work will permit, pastures will be constructed at lookout-smokechaser points where horses are required. In cases where there is material difficulty in holding smokechasers' horses, pasture fences to remedy the situation should be given high priority.

The maximum progress will be made in the protective improvement pro-

gram only if full use is made of contributed time.

### *Marking Trails and Ways*

Trails and ways used by first line of defense, day or night, should be so marked that there will be as little lost time as possible in going to a fire.

Where necessary and where tree blazes do not satisfactorily indicate the way, the use of a plow furrow, suitable piles of rock, etc., may be used. In any event, mark the route so it will be practical to follow it, even at night with a Stonebridge lantern or flashlight. A plow furrow across openings of size will often be the most practical and satisfactory marking to make and maintain and to follow.

### *Authorized Protective Improvements*

See, "O, Improvement, R-4 Building Plans" circular letter of March 12, 1934.

## FIRE TRAINING

### *Training Principles*

The experience gained at fire training camps indicates that the following points are of particular importance in effective fire training:

1. Training is based on the job. Teach the man to do the things he has to do. It all comes down to two questions: What does he do? What must he know?

2. Teach only one thing (step, operation) at a time. Things not essential to that step detract. Do not start on the second step until the first is well completed.

3. Men will normally do good work if they know how.

4. Show them how. First demonstrate, then test them.

5. This involves:

- (a) An objective, a clear-cut idea of just what you want to put across. Usually tell the trainee what it is.

- (b) Preparation, detailed on your part. Some advance preparation of the trainee is advisable when practical. Have all work well laid out in advance, and have decision made as to how to take it up with trainees to best advantage.

- (c) Demonstrate, show how.

- (d) Supervision, have trainee do it under direction of teacher.

- (e) Test, have trainee do the job on his own. You find out whether he has learned. If he hasn't learned, repeat the process if you desire to retain the trainee.

6. We learn through our ears, eyes, and muscles. Use all three where possible.

This means. tell them how, show them how, have them do it and give it to them in writing (at least a tickler list) as a reminder, and for their future review.



### *Fire Guard Camps*

On each forest when there are untrained men, one or more field training camps will be conducted annually by the Supervisor or the Ranger for all fire patrolmen, smokechasers, lookouts, and also for per diem guards, and for such other men as the Supervisor desires to have attend. They will receive the same rate of pay as during the fire season. In cases where only one or two men are to be trained on the forest, this may be done on the job. As a rule old fire guards should have the benefit of a training camp at least every third year. All new regular protective guards and all guards who have shown an insufficient grasp of fire control work will be trained each year at training camp, or at their stations (or their units) or in both ways.

Prospective emergency guards will be trained in those years whose pre-season weather conditions indicate the probability of a materially worse than average fire season.

### *Overhead Training Camps*

Training camps will be held primarily for Rangers, road foremen and other temporary employees having fire boss or fire foreman capacity. On the high and medium hazard fire forests the entire ranger personnel and such of the temporary force as will probably be needed for overhead work should receive instruction at group training camps every two to four years.

Camps should be held as early in the spring as practical to minimize interference with other work. Training should cover a period of three or four days and should consist largely in developing leadership or foremanship essentials and the broad phases of fire control.

Years for overhead training camps will be selected on the basis of pre-season weather conditions, as far as practical.

### *CCC's*

All the overhead and not fewer than 25 CCC's in each main CCC camp and not fewer than 10 CCC's in each side camp will receive annual fire control training. This is a minimum standard for all forests and on the high hazard forests a larger percentage of CCC's should receive this fire control training, not fewer than 50 and all leaders and assistant leaders. When a bad fire season is forecast, a forest will train all CCC's in fire control.

Arrangements will be made with the camp commanders to avoid disruption of trained fire control groups during the fire season.

### *Responsibility*

The Forest Supervisors will be responsible for the preparation and establishment of all fire training camps. Rangers will be responsible for all training on the job.

### *Training Fires*

Advantage will be taken of preseason fires in the training of CCC's and any available untrained men in fire control work.

### *Test Smokes*

The use of test smokes in stepping up detection and first line suppression

practices is approved. A standard of not less than one test smoke per year on each Ranger District, employing paid protective guards, will be met by each Forest Supervisor.

The test should cover the detection time for each visible lookout, also report, get-away and travel time as well as the state of preparedness with tools and equipment upon arrival at test point when practical. Regional Office will make central purchase of and distribution of smoke flares each season in sufficient amount to furnish two flares for each Ranger District involved.

## EQUIPMENT

### *Fire Tools and Equipment for Use in Fire Control Only*

On all the forests, tools and equipment will be provided for fire control work. They will be branded and marked in accordance with the standard set up in the Equipment Manual. Red paint will be used to designate fire tools and equipment, and these will be *used exclusively for fire control*. No other policy is satisfactory.

### *Tool Boxes and Fire Tools for Improvement and Other Crews*

All forest service employees working on high hazard areas on the main fire forests during the dangerous period, must have sufficient tools and equipment ready so that all the men can be fitted out promptly for fire suppression work. These must be tools and equipment in addition to those used at the regular work in which the men are engaged. They should be up to the standard set for the size of the crew concerned. They should be boxed, wrapped or otherwise cargoed ready for immediate transportation. They should be kept together in camp and used for fire control purposes only and should be marked accordingly. Mess outfits should be included.

### *Grouping of Fire Outfits*

Grouping at Supervisor headquarters, Ranger headquarters, etc., will be in complete crew units. These outfits will be boxed, cargoed, or otherwise segregated to secure prompt get-away and to provide that all tools and equipment necessary to properly equip a crew will go to the fire together, and that nothing essential will be left behind regardless of what messenger may be sent to get them.

### *Condition and Repair of Fire Outfits*

Tools and equipment will be ready for immediate use at all times. Upon return from a fire all will be promptly reconditioned, and losses and break-ages replaced. Edged tools will be kept continually sharp, greased, and tightly handled. Water containers will be inspected periodically to assure usability. When equipment becomes obsolete for fire control work, and it is desired to transfer to other activities, the red paint should be removed.

### *Distribution of Fire Equipment*

As a general policy tools should be stored where the man power is available. The man power available, the present transportation facilities and the relative fire hazard, therefore, should govern the distribution and placement of fire tool units. This distribution should be covered specifically in each forest fire plan.



### *Fire Tools for Traveling Forest Officers—(Mandatory)*

On the fire forests during the fire season, forest officers will carry sufficient fire tools to supply each member of the party.

When traveling by auto or when accompanied by a pack horse, forest officers will each be expected to carry the Koch tool-axe or the Shovel-Pulaski tool combination, a water container and a one-day ration.

With the exception of guards or patrolmen on fire duty, an officer on horseback, but unaccompanied by pack horse, will carry at least a shovel and Pulaski tool, or shovel and axe, and a canteen. The carrying of rations under such conditions will be left optional. The officer should have tools with which he can chop and with which he can trench and throw dirt, and something in which to carry water.

### *New Standards*

Until the Region or forest can finance the purchase of tools and equipment to meet the following standards, outfits may be assembled from tools on hand to meet the present standards.

It may be necessary to order fire-fighting equipment from R-1 during hazardous years. These outfits will not meet the R-4 standards. Soon after the fire season, and in no case later than the following winter, all R-1 outfits will be reassembled to conform to R-4 standards.

At the end of every fire season replacements of fire tools and equipment that have been worn out, broken, lost, or burned up, will be made from F. F., as soon as practical, and in no case later than December 15.

Decker packsaddles are standard for all pack equipment.

It will be the policy to furnish all forest service employees Kapok sleeping bags for field use, at Government expense.

#### *Saw Filing Outfits—Standard.*

- 1 Hammer, swedging
- 1 Morin lever or hand block
- 4 Files, 7 inch
- 1 Morin No. 6C raker gauge
- 1 Spider
- 1 One-half pint flat oil can with screw top for coal oil
- 1 Canvas container

#### *Pumps, Portable Power.*

There is a real place for fire pumps in fire-fighting operations, especially in mopping up. These needs can be met best by the placing of the pumps at accessible points on the forest and the larger needs of an emergency season can be supplied from a central Regional warehouse, and from stocks kept on hand by the manufacturers.

Wherever the forest service stocks portable pumps, 1200 feet of 1½ inch rubber lined hose should be kept with the pump. Linen hose may be stocked where and when advisable.

With each pump sent out to a fire the minimum requirements with it should be: (Boxed or cargoed for complete and quick shipment and for packing on horses.)

- 1 Pump, Edwards or Pacific, or equal. Reconditioned each season if used, (See letter "O-E&S" of Oct. 15, 1931.)
- 1 Hose, suction, with 6" strainer, gauze covered, 1½ inch, wire ribbed, fitted with male and female expansion ring couplings: Length 6 feet for 2 cycle units  
10-12' for 4 cycle units
- 1 5 gal. gas tank. Back pack type (Indian or equal) with 5 ft. gas line
- 1 Check valve, 125 lb., 1½" swing check
- 1 Funnel w/strainer
- 2 Nozzles,  $\frac{5}{16}$ " dia. opening } or 2 adjustable nozzles
- 1 Nozzle,  $\frac{3}{16}$ " dia. opening }
- 3 Spanner wrenches, small with loop handle
- 1 Pair pliers, 6-8" combination
- 1 Screwdriver, 4 to 6 inch blade
- 1 Wrench, 6" Crescent
- 1 Gun, grease, Zerk
- 1 Can grease, 1 lb.
- 2 Gal. good grade of medium-bodied paraffine base oil. Use one pint oil per gallon of gasoline for lubrication  
White rags or waste
- 1 Siamese valve
- 24 Gaskets, rubber coupling, 1½"
- 1 Flashlight or Stonebridge lantern
- 1 Knapsack with heavy canvas inner-lined bag
- 2 Starting ropes
- 1 Small ball pein hammer
- 1 4" cold chisel
- 1 Spark plug wrench
- 2 Extra spark plugs
- 1 Pack frame
- 10 Gal. gasoline
- 1 Pound waterproof grease
- 1 Pack cover
- 1 Instruction card for 4 cycle outfits
- 1200' 1½" hose

For 2 cycle units—the grease gun can be omitted; but 1 gland wrench and 1 double end  $\frac{5}{16}$  x  $\frac{3}{8}$  wrench, 1 quart measure with trip spout, and 1 instruction card should be furnished and:

- $\frac{3}{8}$  inch instead of  $\frac{5}{16}$  inch nozzle
- 1 Duplex auto pail or equivalent
- 1 4' back-pack-can hose

Copy of list with extra blank lines to be printed or typed on heavy card or linen and fastened to shipping case and protected by celluloid.



Fire hose will give satisfactory service if the following simple rules are observed:

- (1) Wash off the jacket and dry thoroughly after each period of use, but do not expose the hose to hot sunlight for the purpose of drying it.
- (2) Do not coil any more closely than is necessary to prevent the coils telescoping when being handled.
- (3) Store in driest and coolest place available, preferably one with free air circulation, and keep uncoiled while in storage during non-fire season.
- (4) With the exception of wear and tear while in use, mildew, heat and non-use shorten the life of fire hose more than any other cause.

(See instructions sent with letter "O-E&S" of October 15, 1931.)

#### *Canteens*

One-quart size discontinued, except by transfer. Two-quart and 4-quart are now standard sizes.

#### *Grinders, Portable Power*

As a general rule, portable power grinders should be available where fires necessitating the use of 50 or more axes or similar cutting tools can be expected. This may mean one or more such grinders at ranger headquarters on fire forests.

#### *Grinders, Foot Power*

Present Luther Hummer is apparently satisfactory.

#### *Grinders, Hand Power*

Will be handled by central purchase.

#### *Care of Cook Outfits*

Tinware and steel in nested cook outfits should be given a light coating of Oronite, Crystal Oil or a similar rust preventive, when stored in damp places or before storing for the winter. These oils are colorless and tasteless and it is not necessary to wash the utensils before using them. This oil costs approximately \$1.20 per gallon. Mineral oil may also be used.

Replacement parts should be ordered promptly, preferably before end of fire season.

#### *Oiling Metal Parts*

Metal portions of cutting tools and similar equipment should be treated with liquid petroleum frequently enough to prevent rust. Particular attention should be given this before storing for the winter.

#### *Blankets*

Blankets, Kapoks, etc., should be stored in mouse-proof rooms or cupboards. Some of the commercial insecticides should be used for moth proofing. Bundling in canvas or heavy burlap wrappers is desirable where any considerable stock is kept. Twenty blankets to the bundle is a good enough standard. Blankets used during season will be laundered, if necessary, at end of fire season. Blankets in Kapok beds used during season will also be laun-

dered. Kapok bags will be dry cleaned, when necessary. Laundry and dry cleaning is an FF charge for beds used in fire control.

### *Loose Handles*

It has been found that dipping axes and lower portions of the handles of Koch tools in boiling linseed oil for a period of about five minutes effectively shrinks the handles so that when the handles are rewedged, further loosening rarely occurs.

### *Kits, Camp Boss and Timekeeper*

Canvas carrying case or the canvas-covered light-weight kit as developed at the Spokane Equipment conference will be used for outfits of 10 men and over.

Up to and including 5-man units, sealed envelopes will be used as containers.

Check Lists: Check lists of all outfits will be printed by R. O. with block ☐ for checking.

### *Back Pack Units*

Experience in quick action on fires has developed the need to have the men back-pack from the end of the road or landing field, for their first attack, tools, Kapok bed, water container and an emergency ration.

This is an approved practice in R-4 and the Supervisor of each fire forest should include in his forest plan, statement of the need for and the amount and location of such back-pack equipment.

All standard tool outfits, except the "25-man supplemental" and the "25-man additional" will be cargoed for transportation in one-man back pack units.

Beds have been eliminated from all outfits, but will be promptly moved onto all fires not corralled and pretty thoroughly mopped up or expected to be in 24 hours.

### *Lights for Night Work*

Effective night work depends on having suitable lights on hand and available for use.

The furnishing of flashlights (headlight type) to fire crews will be standard practice on all high hazard forests.

Stonebridge lanterns will be standard on medium and low hazard forests.

### *Experimental Equipment*

Certain standards are being set up at this time, but not with the idea that they will necessarily be permanent and no further progress will be made in the development of new equipment and new standards. However, in order to prevent a duplication of expense with items that have already been tried out and found wanting, it is necessary for all trials of new equipment to be first approved by the Regional Office before any considerable amount of time or money is expended upon them.



### *Standard Units*

Forests of R-4 are discussed in this Handbook as high hazard, medium hazard, and low hazard groups. The grouping follows:

#### *High Hazard*

Boise  
Challis  
Idaho  
Payette

Salmon  
Sawtooth  
Weiser

#### *Medium Hazard*

Ashley  
Cache  
Lemhi

Targhee  
Teton  
Wasatch  
Wyoming

#### *Low Hazard*

Caribou  
Dixie  
Fishlake  
Humboldt  
La Sal

Minidoka  
Manti  
Nevada  
Powell  
Uinta

All forests will maintain such standard fire tool units as approved by the Regional Forester.

For all forests, in order to meet variations in local conditions, a 25% leeway is allowed between classes of digging, cutting, and water carrying equipment.

### ONE-MAN OR SMOKECHASER'S OUTFIT

#### Standard Set Up

- 1 Pulaski tool and sheath
- 1 "Baby" shovel
- 1 Electric headlight and set of extra batteries and 1 extra bulb
- 1 File, 10 inch, F.M.B.
- 1 Water bag, 2½ gal.
- 1 Hand towel, and 1 small soap
- 1 First-aid kit, small emergency
- 1 Knapsack or pack frame
- 2 Rations, emergency, one-day
- 1 Timekeeper's kit

Relative to any number of men who travel by horse to a fire, beds will not be taken unless dispatcher otherwise instructs. At least one Kapok will be kept at each Smokechaser's Station for possible need on fires.

### THREE-MAN OUTFIT

Where fire plan calls for 3-Man Outfits, 3 One-Man units will be substituted.

## FIVE-MAN OUTFIT

### Standard Set Up

- 3 "Baby" shovels
- 3 Pulaskis
- 2 Files, 10 inch, F.M.B.
- 1 Whetstone, round
- 3 Electric headlights and 3 sets extra batteries and 3 extra bulbs
- 3 Water bags, 2½ gal.
- 6 Fusees for burning out (optional)
- 5 Hand towels and 5 small cakes of soap
- 2 First-aid kits, small
- 5 Knapsack or pack frame
- 5 Rations, 1 day
- 1 Timekeeper's kit

## TEN-MAN OUTFIT

### Standard Set Up

- 5 "Baby" shovels
- 2 Axes, D. B., 3½ lbs.
- 5 Pulaski tools
- 2 Files, 10 inch, F.M.B.
- 1 Whetstone, round
- 5 Electric headlights with 5 sets extra batteries and 5 extra bulbs
- 5 Water bags, 2½ gal., or canteens
- 1 Water bag, 5 gal. man pack
- 10 Hand towels and 10 small cakes soap
- 9 Knapsack or pack frame
- 6 Fusees for burning out (optional)
- 1 Timekeeper's kit and forms
- 1 White marker, 12' x 4' muslin
- 4 First-aid kits, small
- 10 Rations, emergency, 1 day
- 1 Kettle, or 1 coffee pot (optional)
- 1 Saw, X-cut and 2 handles (5½' felling pattern)

Three, five, and ten-man crews will be consolidated into 25-man crews if fire goes into extra period or project stage. Rationing and other extra equipment for them is included under "additional equipment" for 25 men.

## TWENTY-FIVE-MAN OUTFIT

### Standard Set Up

- 10 "Baby" shovels
- 2 Axes, D. B., 3½ lbs.
- 12 Pulaski tools
- 1 Saw, X-cut, 5½ or 6½ ft., felling type
- 6 Files, 10 inch F.M.B.



- 2 Whetstones, round
- 2 Wedges, felling 1½ lbs. (optional)
- 15 Electric light headlamps and 15 sets extra batteries and 15 extra bulbs
- 10 Water bags, 2½ gal.
- 2 Water bags, 5 gal. man-pack
- 2 Kettles or coffee pots (optional)
- 4 First-aid kits, small
- 25 Knapsacks or pack frames
- 1 Hand pump with back pack cans or bags
- 1 Pt. kerosene for saws
- 1 Timekeeper's kit and forms
- 1 Pr. saw handles, X-cut
- 1 Can for oiling saws (filled)
- 12 Fusees for burning out (optional)
- 25 Hand towels and 25 small cakes soap
- 1 Marker, 4' x 12'
- 1 PF radio or tel. test set (optional)
- 25 Emergency rations

“ADDITIONAL EQUIPMENT” NEEDED FOR EXTRA PERIOD OR  
PROJECT FIRES—EACH 25 MEN ALREADY ON THE FIRE

- 5 “Baby” shovels
- 5 Axes, D.B., 3½ lbs.
- 2 Saws, X-cut, 5½ or 6½ ft.
- 1 Saw filing outfit, with swedging hammer
- 6 Files, 10 inch
- 1 Tool grinder and axe stone
- 2 Hammers, 2½ lbs.
- 4 Wedges, felling, 1½ lb.
- 5 Water bags, 2½ gal.
- 5 Water buckets, canvas
- 1 Cook outfit, 25-man, nested
- 1 Canvas fly, 10 x 12
- 1 First-aid kit, large
- 1 Kimmel stove, with 2 drip pans for oven
- 2 Hand pumps, with backpack bags or cans
- 6 Lanterns, gas, with 10 mantles, 2 generators, pair pliers and small funnel
- 1 Qt. kerosene oil
- 5 Gal. gasoline
- 2 Pr. X-cut saw handles
- 2 Cans for oiling saws
- 1 Commissary box with padlock and keys
- 25 Fusees
- 30 Kapok beds
- 5 Wash basins
- 6 Grady wedges

The list of "additional equipment" under the 25-man outfit is all that is needed to equip 25 men, originally sent to a fire with the light standard outfits, for fire fighting for any length of time required. This equipment will be cargoed separately from the standard outfit. It is not essential that it reach the fire until toward the end of the first 24 hours, but will be moved in as soon as convenient and so as not to interfere with the movement of the men for whose use it is intended.

#### TWENTY-FIVE-MAN OUTFIT (Supplemental)

- 10 "Baby" shovels
- 6 Axes, D.B., 3½ lb.
- 10 Pulaski tools
- 25 Beds, Kapok
- 25 Plates, tin
- 25 Cups, tin
- 25 Forks
- 25 Knives
- 25 Spoons
- 25 Emergency rations
- 25 Hand towels and 25 small cakes soap

This outfit will be assembled separately from the standard 25-man outfit, which when added to the standard will enable 50 men to be worked. Supplemental outfits will be provided for about 25 percent of the number of 25-man outfits held on any forest. The Ogden warehouse will maintain one supplement boxed separately for *each* 25-man standard unit it keeps.

All flashlight batteries will be kept out of flashlights and wrapped separately in paper to prevent shorting and drain.

The above outfits will be standard for all forests in Region 4, except that the Forest Supervisors of the low and medium hazard groups will use as long as they last:

Long-handled shovels for baby shovels.

Axes, Hazel hoes, Koch tools or brush hooks for Pulaskis.

Stonebridge lanterns for electric headlights as previously stated. Stonebridge lanterns will continue standard.

Special consideration may be obtained for placement and use of emergency rations only where needs justify.

When present equipment is worn out by use on fires, replacements may be made at new standard, except for lights.

The low hazard forests may add special tools suitable for their needs, upon approval by the Regional Office.



NESTED COOK AND MESS OUTFITS, STANDARDIZED  
OCTOBER, 1931, SPOKANE EQUIPMENT MEETING

*One-Man Mess Outfit*

- 1 Pan, aluminum, pudding, 7 $\frac{1}{4}$ " diameter, 1 $\frac{1}{2}$ " deep, 1 $\frac{1}{2}$  pint capacity
- 1 Pail and cover, aluminum, 5" diameter, 2 $\frac{5}{8}$ " deep, and 1 $\frac{1}{4}$  pint capacity
- 1 Fork, tinned steel
- 1 Spoon, tinned steel
- 1 Pan, fry, with folding handle
- 1 Cup, aluminum, 4" diameter, 2 $\frac{5}{16}$ " deep,  $\frac{3}{4}$  pint capacity
- 1 Case, canvas carrying

Approximate cost, f.o.b., Oakland.....\$1.21 each

*Two-Man Mess Outfit*

- 1 Container, canvas
- 1 Pan, fry, 9 $\frac{1}{4}$ "
- 1 Pail, aluminum, No. 877, with cover
- 1 Pail, aluminum, No. 878, with cover
- 1 Pan, 3-qt. tin
- 2 Pans, 1-qt. tin
- 1 Pot, coffee, aluminum
- 2 Plates, tin
- 2 Cups, tin
- 2 Knives, table
- 2 Forks, table
- 1 Spoon, dessert
- 2 Spoons, tea
- 1 Knife, paring
- 1 Knife, butcher, folding
- 1 Opener, can

Approximate cost, f.o.b., Oakland.....\$6.75 each

*Three-Man Mess Outfit*

- 1 Container, canvas
- 2 Pans, fry, 9 $\frac{1}{4}$ "
- 1 Pail, aluminum, No. 877, with cover
- 1 Pail, aluminum, No. 878, with cover
- 1 Pan, tin, 3-qt.
- 3 Pans, tin, 1-qt.
- 1 Pot, coffee, aluminum
- 3 Plates, tin
- 3 Cups, tin
- 3 Knives, table
- 3 Forks, table
- 3 Spoons, dessert
- 3 Spoons, tea
- 1 Knife, paring
- 1 Knife, butcher, folding
- 1 Opener, can

Approximate cost, f.o.b., Oakland.....\$7.10 each

### *Six-Man Mess Outfit*

- 1 Container, canvas
- 1 Pail, aluminum, No. 877, with cover
- 1 Pail, aluminum, No. 878, with cover
- 1 Pail, aluminum, No. 880, with cover
- 1 Pail, aluminum, No. 881, with cover
- 3 Pans, fry, 10"
- 3 Pans, tin, 2-qt.
- 8 Pans, tin, 1-qt.
- 8 Plates, tin
- 6 Cups, tin
- 8 Spoons, dessert
- 8 Forks, table
- 8 Knives, table
- 1 Knife, paring
- 1 Knife, butcher, folding
- 1 Stone, carborundum
- 1 Opener, can
- 4 Kettle chains
- 1 Clock, alarm
- $\frac{1}{3}$  lb. nails, 6d and 20d
- 2 Towels, dish
- 2 Towels, hand
- 1 Lifter, pot

Approximate cost, f.o.b., Oakland.....\$13.25 each

### *Ten-Man Mess Outfit*

- 1 Container, tin,  $12\frac{3}{8}$ "x $12\frac{3}{4}$ ", with cover
- 1 Pail, aluminum, No. 880, with cover
- 1 Pail, aluminum, No. 881, with cover
- 1 Pail, aluminum, No. 882, with cover
- 1 Pail, aluminum, No. 883, with cover
- 2 Pans, fry, 10"
- 2 Pans, fry, 12"
- 3 Pans, pudding, 3-qt. tin
- 14 Plates, tin
- 12 Cups, tin
- 1 Spoon, basting, 10"
- 14 Spoons, dessert
- 12 Forks, table
- 12 Knives, table
- 1 Knife, paring
- 1 Knife, butcher, 8"
- 1 Carborundum stone
- 1 Opener, can
- 4 Kettle chains
- 1 Clock, alarm
- $\frac{1}{2}$  lb. nails, 10d and 20d



- 3 Towels, dish
- 3 Towels, hand
- 2 Lifters, pot

Approximate cost, f.o.b., Oakland.....\$20.55 each

*Twenty-five-Man Mess Outfit*

- 1 Container, 25-man, galvanized
- 1 Cover for 25-man container
- 2 Pans, half oval
- 2 Pails, half oval and covers
- 1 Box, knife and fork, tin
- 1 Pail, tin, 6-qt. 8" diameter, 10" deep, with cover
- 1 Pail, tin, 9-qt. 8½" diameter, 11" deep, with cover
- 1 Pail, tin, 13-qt. 9" diameter, 12" deep, with cover
- 1 Pail, tin, 16-qt. 9½" diameter, 12" deep, with cover
- 2 Pans, fry, 12"
- 30 Pans, tin, 1-qt.
- 12 Pans, tin, 3-qt.
- 4 Pans, enamel, 3-qt.
- 30 Plates, tin
- 30 Cups, tin
- 30 Knives, table
- 30 Forks, table
- 30 Spoons, dessert
- 12 Spoons, table
- 2 Spoons, basting, 14"
- 1 Fork, meat
- 1 Knife, butcher, 10"
- 1 Knife, butcher, 7"
- 2 Knives, paring
- 2 Lifters, pot
- 1 Masher, potato
- 3 Openers, can
- 1 Turner, cake
- 1 Whip, egg
- 6 Kettle chains
- 1 Clock, alarm
- 2 Files, 8", flat mill bastard
- 50 Bags, paper
- 30 Sacks, lunch (cloth)
- 4 Buckets, canvas water
- 1 Stone, scythe
- 10 Towels, dish
- 150 Towels, paper
- 4 Knapsacks, white, No. 10 duck
- 2 lbs. nails, 20d
- 2 lbs. nails, 40d

- \*1 Can lye
- \*1 Can matches, safety
- \*6 Bars laundry soap
- \*6 Bars hand soap
- \*1 Hammer, claw

Approximate cost, f.o.b., Oakland.....\$45.00 each

(\* These items should be added. They will probably not be included in original outfit when received.)

## TIMEKEEPER'S KIT

### *One-Man*

- 1 Container, envelope, 6 $\frac{1}{2}$ " x 10 $\frac{1}{2}$ "
  - 1 Pencil, 2 H. with eraser
  - 3 Fireman's report, Form 592
  - 1 Notebook, Form 876 or diary
  - 1 Map of forest,  $\frac{1}{4}$ " scale (optional)
- To be taken by smokechasers to every fire.

### *Five-Man Outfit*

- 1 Container, 9 $\frac{1}{2}$ "x12", manila envelope
- 2 Pencils, 2 H. and 3 H., with erasers
- 1 Pencil, indelible
- 10 Time slips
- 1 Sheet of 5 sample time slips
- 1 Map of forest
- 1 Notebook, Form 876
- 4 Envelopes, No. 9
- 2 Sheets carbon paper, notebook size
- 10 Sheets yellow paper
- 1 Wage schedule (current)
- 2 Fireman's report, Form 592
- 2 Lists of tools, five-man outfit
- 2 Lists of equipment, five-man mess outfit

### *Ten-Man Outfits*

- 1 Carrying case, canvas, stencil FIRE
- 25 Time slips
- 1 Notebook, Form 876
- 5 Envelopes, No. 9 size
- 1 Instructions to timekeepers
- 1 Instructions to fire boss
- 1 Map of forest (furnished by Supervisor or Ranger)
- 1 Page of 5 sample time slips (furnished by R. O.)
- 1 Pencil, indelible
- 2 Pencils. 2 H. and 3 H., with erasers
- 10 Clips, Gem, small
- 1 Wage schedule, R-4 (current)
- 3 Fireman's report, Form 592



- 2 Lists of tools in ten-man outfit
- 2 Lists of mess equipment in ten-man outfit
- 2 Sheets, carbon paper, notebook size
- 1 Copy of this list

### *Twenty-five-Man Outfit*

- 1 Carrying case, canvas, stenciled FIRE to contain the following items:
  - 1 Copy of this list
  - 1 Map to be furnished by Supervisor's or Ranger's office
  - 2 Pencils No. 2 and 3
  - 2 Pencils, indelible
- 25 Assorted rubber bands (replaced annually prior to July 1)
- 25 Gem clips, small
  - 1 Package No. 9 manila envelopes
- 6 Envelopes, large
- 1 Eraser (replaced annually prior to July 1)
- 2 Crayons, lumber, soft black
- 2 Carbon papers, letter size, pencil
- 1 Calendar (replaced each year)
- 75 Time slips and 5 sample time slips  
(Samples furnished by R. O.)
- 1 Fire Handbook, R-4 (optional)
- 2 Wage schedules (current)
- 1 Fire organization chart
- 1 Instructions, Fire Boss
- 2 Instructions, Fire Scouts
- 1 Instructions, Sector Bosses
- 2 Instructions, Foremen
- 4 Instructions, Strawboss
- 1 Instructions, Plow Unit Strawboss
- 1 Instructions, Timekeeper
- 1 Instructions. Cook
- 1 Instructions for man gathering fire cost data
- 50 Property transfer, Form 874-16 (optional)
- 3 Notebooks. Form 876, and carbon paper to fit
- 6 Forms, fire line construction record
- 20 Sheets. yellow paper
- 10 Fire camp order sheet and inventory, Form R-1, F-8 (optional)
- 5 CA-1. Notice of Injury
- 5 CA-2. Report of Injury
- 5 CA-16. Request for Treatment
- 5 CA-17, Request for Treatment When Cause in Doubt
- 1 CA-11. Right of Employee to Compensation
- 1 Pad R-1. F-10 commissary order blanks
- 2 Lists of Tools in Twenty-five-Man Outfit
- 2 Lists of Mess Equipment for Twenty-five-Man Outfit
- 2 Ration lists. R-4
- 4 Forms F-9, R-1, Horse Contract

## PLOW UNITS

### *Responsibility*

The Forest Supervisor will be held responsible for the advance preparation necessary to make plow units available on the fire line. This will consist of procurement of equipment, both transportation and actual plow unit items, the training of personnel, the prompt starting of plow unit to the fire and the transportation thereof. Responsibility for the prompt starting of the plow unit to the fire and the transportation thereof may be delegated by the Supervisor to the Fire Dispatcher or District Ranger.

The forest officer (usually District Ranger) in charge of the fire will be held responsible for failure to get maximum use of the plow on the fire line, after arrival of plow unit.

We can no longer accept excuses for failure to use a plow on fires of size when an examination on the ground shows that the plow was available and could have been used to advantage. Such actual failures will be reason for disciplinary action by the Supervisor or Regional Forester.

### *Policy*

Speed in getting fires under control is of utmost importance. Trenching is often the principal job in fire line construction.

It has been demonstrated that trenching in many cases can be greatly speeded up by the use of plows. These have not been used nearly to the fullest extent practical. Steps must therefore be taken to insure greater use of plows in trenching on fires. Hereafter, whenever it is necessary to dispatch as many as 50 men to a fire, plow units will be started immediately. A plow unit may also be dispatched to fires requiring fewer than 50 men in the discretion of the Supervisor or fire dispatcher.

### *Trained Personnel*

Whenever Government fire plow units are maintained, trained personnel must be provided in advance of the fire season. Advance arrangements should be made every season to transport plow units to fires.

It will be impressed on them that plowing trench is their job; that they should get and keep the plow unit on the line, following as closely as practical the men doing the clearing, and plowing trench wherever possible.

Full advantage should be taken of all road, trail and ECW crews for advance preparation of plow unit personnel.

To get the plows used to the maximum on the fire line we have a problem of demonstration and instruction on our hands, to get not only the members of the plow unit plow-minded but our regular and permanent personnel as well.

### *Transportation*

Generally truck transportation of plow units is necessary in order to get quick action in fire suppression. A body may be built upon the truck with a hinged rear door to serve as a platform to load and unload horses at the end of road transportation.



While generally trucks are the fastest, surest and most economical way of transportation of the plow units, in some circumstances trailers may be substituted. Also crates may be prepared in advance for transportation where different and unstandardized rented trucks must be used.

#### *Cooperative Equipment*

Where funds are not available or where fire danger does not make the purchase and storing of plow units practicable, the following procedure will be necessary:

Contracts should be made in advance of the fire season with local settlers, contractors, miners, sawmill operators and others having available teams, harness, plows and trucks for their use upon fires when called upon. If possible in order to get the maximum use, proper training of these co-operators will be given. Such contracts should specify the value and purchase price of each item of equipment so hired, in order that there may be a proper basis for reimbursement for damages. Try out horses in advance of fire.

#### *Equipment*

To the limit of all funds available, we must get the additional plow unit and transportation equipment necessary and when the plow unit is placed on the fire WE MUST USE IT.

More plow horses and plows must be bought and kept on fire suppression. Road crews may well be equipped with plow horses, plow and other equipment needed to use the plow on fires. Trail-construction plow units should be considered as supplemental fire suppression equipment. Horses kept and used on road and trail work will be in better shape for use on fires than if kept idle in pastures.

Arrangements should be perfected on each of the high hazard fire forests to provide for one to three Government-owned plow units. On the medium hazard forests one Government-owned plow unit complete, except the plow horse, and truck will be maintained and advance contracts will be executed each year for horses and transportation. Ownership of trucks for fire use only will have to be kept to a minimum. Dependence must be placed on rental of trucks where practical, and if to be Government-owned, some use other than to haul horses, etc., to fires should be made most of year.

It will be good practice to hire horses with an option of purchase. Supervisors should make advance survey of available and suitable plow horses, either for hire or purchase when the need arises.

Extreme care should be used in selecting plow horses. They should weigh from 1400 to 1800 pounds. They must be sure-footed, gentle, steady and dependable; they must be well broken to plow and to work alone. In every case they should be tried out before purchase.

The McCormick-Deering No. 209 side hill plow has given the best and most satisfactory service. The beam is fastened in such a manner to the plow share that a minimum amount of sticks and rubbish is gathered. The Oliver No. 155 side hill plow is used to some extent. This plow pulls more heavily and clogs up more readily than the McCormick-Deering No. 209. Each of these plows weighs around 130 lbs. The Regional Office will make such ad-

vance arrangements with dealers as necessary to insure getting these plows and all new purchases will conform to this standard.

### STANDARD REQUIREMENTS FOR PLOW UNITS

Take for Initial Attack	Standard	
1	1	Plow, about 130 lbs. Reversible McCormick-Deering No. 209 or Oliver No. 155
1	1	Singletree, heavy, full length strap type, approx. 3 inches by 28 inches.
1	1	Harness, single set, heavy work type, with butt chains.
1	1	Collar.
1	1	Packsaddle, Decker, for large horse. With pads, blankets, cargo and sling ropes.
--	1	Extra plow share.
--	1	Set plow bolts, extra.
1	1	10 inch wrench, Crescent
1	1	Pair pliers.
--	1	Chain, log, $\frac{5}{16}$ x 12 feet with hooks.
1	--	Clevis, half twist, plow.
--	1	Nosebag.
--	1	Brush and curry comb.
--	1	5 gal. water bag.
1	1	Halter.
--	1	Set hobbles.
--	25	Feet No. 9 or 12 wire.
--	1	Lantern, gas, extra generator, 12 mantles, 1 gal. gas boxed.
--	1	Container, canvas, for small tools.
--	1	Axe, with sheath.
--	3	Beds, Kapok, back pack.
--	1	Bale hay.
10	50	Pounds oats
--	3	Emergency rations.
2	2	1-man smokechaser's outfits. (Man back pack.)

Standard outfit will be cargoed, ready to go, with initial attack outfit cargoed as a separate unit and plainly marked as such. This initial attack outfit will be packed on plow horse at end of road. (Weight about 225 lbs.) Two of plow unit men will back pack smokechaser outfits. Balance of standard outfit will follow as fast as pack stock is available.

### CENTRAL STORAGE OF EMERGENCY EQUIPMENT

The central storage of emergency fire-fighting equipment necessary over that required by the forests will be stored at the Ogden warehouse.

Each CCC camp will be provided with ECW fire tools in the amount that camp location will justify. It is suggested that on the high hazard and medium hazard fire forests tools and equipment for at least 50 CCC enrollees



be maintained at each main camp and one 10-man outfit at each side camp. On the low hazard forests a minimum of one 25-man outfit is suggested for each main CCC camp.

When the stock at Ogden has been reduced to 60% of the original amount by going fires, replacements will be ordered immediately from the R-1 warehouses at Spokane or Missoula, or purchased elsewhere if not available in R-1, and charged to the fire projects to which the original equipment was sent.

It will be the policy to keep no more fire tools on any forest than seems necessary to insure no delay in supplying the necessary fire-fighters with tools. As soon as any considerable percent of the fire tools on a forest are put to use on fires, more will be ordered and sent from central storage. By keeping the amount on the forests as small as is consistent with safety and depending on central storage for additional units, it will be possible to both play safe and still keep to a minimum the total fire tools and equipment for the region.

### EMERGENCY RATIONS

Standard emergency rations will be purchased from R-1 through the Regional Office, as in the past. During emergency years and where it is probable that pack trips will be necessary, rations will be assembled and labeled for each meal for the first day or two out, and packed separately in suitable containers.

Fresh vegetables and fresh meat should be furnished when practicable.

Fire rations should be issued to road crews in bad years, boxed and used for fire only.

Baker's bread should be used in fire camps whenever it is practicable. The use of flour will save pack stock.

Fruit furnished for use in camp after the first two days should be dried fruit, particularly where long pack trips are necessary. Small cans of fruit (8 oz.) should be furnished for lunches in all cases.

Foods of good quality should be furnished fire camps.

Each member of fire crews leaving towns or cities should be provided with travel lunches in all cases where there is likelihood of not reaching a fire camp in time for the next meal.

By telephoning ahead provision may often be made for meals enroute.

The one-day emergency rations will be ordered and distributed by the Regional Office on estimates furnished by the forests. These may be purchased from F. F.

Units containing 30, 60 and 100 rations will be boxed and labeled with weights, use, and contents according to the R-1 practice. For the present these will be procured from R-1. These units have been found to be very convenient, especially for the first two or three days of a fire.

Forests desiring any of these rations should send their estimates to the R. O. at an early date. The rations come boxed for cargoing and packing on horses.

The Regional Office annually will review emergency and standard ration lists, and endeavor to improve contents and reduce weights to a minimum.

# FIRE CREW RATION LISTS

ARTICLE	Unit	For Packing Over Five Miles						Along Roads or Under Five Mile Pack					
		Three Days			Five Days			Three Days			Five Days		
		5 Men	10 Men	25 Men	5 Men	10 Men	25 Men	5 Men	10 Men	25 Men	5 Men	10 Men	25 Men
Meat, either*													
Fresh Meat.....	Pounds												
or Bacon.....	Pounds												
Ham, Cured.....	Pounds												
Ham, Canned.....	Pounds												
Eggs.....	Dozen												
Bread, Crackers or Flour													
Bread.....	Lb. Loaves												
or Crackers.....	Pounds												
or Flour.....	Pounds												
Yeast, with Flour.....	Yeastfoam												
Baking Powder.....	Pounds												
† Lard.....	Pounds												
Sugar.....	Pounds												
Syrup, cane.....	Quart												
Coffee, ground.....	Pounds												
Tea.....	Pounds												
Cocoa.....	Pounds												
Milk.....	Pounds												
Butter (in tins if available)	Pounds												
Beans, dried.....	Pounds												
§ Cheese, American.....	Pounds												
Rice.....	Pounds												
Potatoes.....	Pounds												
Onions, dry.....	Pounds												
Macaroni.....	Pounds												
Pancake Flour.....	Pounds												
Cereals, Oatmeal, Etc.....	Pounds												
Jam.....	No. 2 Cans												
Vegetables, canned.....	No. 2 Cans												
Corn, Peas, Carrots, Tomatoes, Spinach, Sauerkraut.....													
Vegetables, fresh.....	Pounds												
‡ Flour.....	Pounds												

\* If amount of fresh meat shown is used, no cured meat will be needed and vice versa. Or some fresh and some cured may be used, in which case reduction in figures given will be made. If 75% of fresh meat shown is used, then 25% of cured meat will be needed.

† Not a full ration of lard—contemplates use of bacon grease.

‡ In addition to bread; this is for thickening, biscuits, hot cakes, etc.

§ Buy in small (1 lb.) well-wrapped packages.



# FIRE CREW RATION LISTS (Continued)

ARTICLE	Unit	For Packing Over Five Miles									Along Roads or Under Five Mile Pack												
		Three Days			Five Days			Three Days			Five Days												
		5 Men	10 Men	25 Men	5 Men	10 Men	25 Men	5 Men	10 Men	25 Men	5 Men	10 Men	25 Men										
Fruit, canned																							
* Lunch, 8-oz. size	Cans	12	24	48	24	48	108	12	24	36	72	24	48	132	24	48	132	24	48	132	24	48	132
Assorted, No. 10 size	Cans	2	3	3	3	4	12	2	3	3	3	3	6	6	3	6	6	3	6	6	3	6	6
Fruit, dried	Pounds	2	4	10	3	6	12	2	4	4	10	2	4	10	2	4	10	2	4	10	2	4	10
Fruit, fresh	Pounds	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Raisins, seedless	Pounds	2	4	8	3	5	10	2	3	4	8	2	3	5	2	3	5	2	3	5	2	3	5
Salt	Pounds	1	1	3	3	3	6	2	2	2	3	2	2	3	2	2	3	2	2	3	2	2	3
Spices: Cinnamon, Etc.	Ounces	X	X	2	X	X	2	2	X	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Pepper	Ounces	2	2	5	2	2	5	2	2	4	6	2	2	4	2	2	4	2	2	4	2	2	4
Extracts, Vanilla, Etc.	Ounces	X	X	5	X	X	8	2	X	2	5	2	X	2	2	5	2	X	2	2	2	5	8
Pickles, sweet	No. 2 1/2 Can	X	1	2	1	2	4	1	1	2	2	1	1	2	1	1	2	1	1	2	1	1	2
Pickles, dill or sour	No. 2 1/2 Can	3	6	15	3	6	25	3	6	15	25	3	6	25	3	6	25	3	6	25	3	6	25
Peanut Butter	Pounds	1/2	1 1/2	3	1/2	1 1/2	3	1/2	1 1/2	3	15	1/2	1 1/2	3	1/2	1 1/2	3	1/2	1 1/2	3	1/2	1 1/2	3
Pork and Beans	No. 1 Cans	6	12	24	6	12	24	6	12	12	24	6	12	24	6	12	24	6	12	24	6	12	24
Matches	Boxes	2	4	8	2	4	12	2	4	6	12	2	4	12	2	4	12	2	4	12	2	4	12
Hershey Bars	Cartons of 24	1/2	1	2	1	2	4	1	1	2	4	1	1	2	1	1	2	1	1	2	1	1	2
Cornstarch, Tapioca	Pound	X	X	1	X	X	3	X	X	X	3	X	X	3	X	X	3	X	X	3	X	X	3
Catsup	Bottle	X	X	X	2	4	6	1	2	4	6	1	2	4	1	2	4	1	2	4	1	2	4
Soda	Pound	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Lunch Meat	Pounds	6	12	24	6	12	30	6	12	12	30	6	12	24	6	12	24	6	12	24	6	12	24
Vienna Sausage, Deviled Meat, Roast Beef, medium grade; Sardines and Salmon, Meat Loaf, Etc., canned		X	X	1	X	1	1	X	X	1	1	X	X	1	X	X	1	X	X	1	X	X	1
Vinegar	Quart																						
Soap, toilet	Bar	2	4	10	2	4	10	2	4	1	10	2	4	10	2	4	10	2	4	10	2	4	10
Soap, laundry	Bar	2	3	6	2	3	6	2	3	3	6	2	3	6	2	3	6	2	3	6	2	3	6
Chlorinated Lime	Pounds	1	2	3	2	3	5	1	2	2	3	1	2	3	1	2	3	1	2	3	1	2	3
§ Bags, cotton, cloth, No. 10	Each	6	12	30	6	12	30	6	12	12	30	6	12	35	8	14	35	8	14	35	8	14	35
Towels, face	Each	5	10	25	5	10	25	5	10	10	25	6	12	30	6	12	30	6	12	30	6	12	30
Towels, dish	Yards	3	5	5	3	5	5	3	5	5	5	3	5	5	3	5	5	3	5	5	3	5	5
§ Bags, paper, No. 6	Each	12	24	60	12	24	100	12	24	40	100	15	30	75	25	50	125	25	50	125	25	50	125
Twine	Balls	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Candles	Each	4	8	20	4	8	35	4	8	15	35	5	10	25	8	16	40	8	16	40	8	16	40
Toilet Paper	Rolls	1	2	5	1	3	6	1	2	3	6	1	2	5	1	3	6	1	3	6	1	3	6

\* For lunches out of camp only.

§ To carry lunches in. The paper sack to go inside the cloth sack.

The following forms will be printed separately and a stock kept on hand in the R. O. subject to forest requisition:

- Instructions for Camp Boss.
- Instructions for Timekeeper.
- Instructions for Cook.
- Instructions for Fire Boss.
- Instructions for Foreman.
- Instructions for Straw Boss.
- Instructions for Fire Scout.
- Instructions for Sector Boss.

Timekeeper's Kit-List of forms and items contained:

- Employment contract.
- Fire Fighter's contract, Form R-1 F-1.
- Time slip.
- Fireman's report, Form 592, R-1.
- Record of fire line constructed.
- Estimated perimeter in chains of fires larger than 50 acres.
- Standard rates of pay for fire-fighting.

Nested cook outfits—Items contained:

- 1 man.
- 2 man.
- 3 man.
- 6 man.
- 10 man.
- 25 man.

Pump tool list and instructions.

Pump tool list (on cardboard for use as check list).

Plow unit tool list and instructions.

Plow unit tool list (on cardboard for use as check list).

Tool list:

- 1 man outfit and instructions.
- 5 man outfit and instructions.
- 10 man outfit and instructions.
- 25 man outfit and instructions.
- 25 man outfit (supplemental) "Additional Equipment" needed for extra period or project fires.

Tool list:

- 1 man outfit (cardboard for check list).
- 5 man outfit (cardboard for check list).
- 10 man outfit (cardboard for check list).
- 25 man outfit (cardboard for check list).
- 25 man outfit (supplemental) "Additional Equipment" needed for extra period or project fires.

Guard inspection form (Form 874C size).

Fire dispatcher record (sheets No. 1 and No. 2).



## EMPLOYMENT CONTRACT

....., 19..... National Forest

I, ..... of ....., having accepted employment offered by the Forest Service, United States Department of Agriculture, at the rate of \$..... per ....., subsistence to be furnished by ....., do hereby agree to the following conditions:

1. That, unless promoted to a higher-paid position, I will perform to the best of my ability, at the rate above specified, any duty to which I may be assigned.
2. That employment will commence at ....., on ....., 19....., and end at .....  
Provided: That if I quit before ....., 19....., or if I am discharged for inefficiency, insubordination, or other discreditable cause, my pay shall cease at the time of such quitting or discharge, and any travel-time allowance or travel expense to or from the job will be deducted from any sum or sums due me.
3. That I will work on any fire, in whatever capacity directed:  
(At my regular rate of pay stated above.  
Cross out one (At the Forest Service standard rate of pay for the position filled.
4. In cases of emergency I hereby agree to work any required number of hours per day on fire suppression when requested to do so, and may be held in camp subject to call for fire duty on Sundays and holidays.
5. Packing and transportation of supplies to point of duty from nearest source of supply will be at Forest Service expense.
6. That at the termination of my employment I will deliver to the officer in charge, or satisfactorily account to that officer, for all Government property which may have been issued to me. Damage to property or loss of it due to misuse or negligence on my part may be charged to me and deducted from any sum or sums due me.
7. That all disputes about time must be settled with the ranger, foreman, or timekeeper at the time of discharge.
8. That I will not smoke during the period of fire danger, designated by notice of Forest Supervisor as from ....., 19....., to ....., 19....., except at camp grounds or improved places of habitation.

In case of accident notify .....

(Name)

(Address)

.....  
(Signature of Employee)

Hired by .....

(Address of Employee)

## FOREST FIRE COOPERATION

### *General*

Except as hereinafter specified, forest supervisors will initiate action looking toward cooperation with Federal, State, county and city agencies, fire associations, stockmen, miners, timber operators, and others having under their jurisdiction lands adjoining the National Forests.

The Regional Forester will initiate action looking toward general cooperation with all agencies operating on two or more forests, such as the General Land Office and State Land Boards. He will also initiate action looking toward cooperation with other departments and agencies such as the Biological Survey, State Game Departments, forest schools, etc., not generally having jurisdiction over land.

Forest Supervisors shall meet with the proper officers of other bureaus and agencies and work out with them plans for the protection against fire of adjoining National Forest and other lands. Plans should cover the following points and such other points as seem necessary or desirable to meet local conditions:

1. Area covered by lookouts and method of reporting fires on cooperator's area.
2. Location of telephone lines and connections, roads, trails, and other improvements used in fire control work. Elimination of uneconomic practices, such as duplication of improvements, patrol, etc.
3. Work out most practicable method of communication for best cooperation in exchanging weather reports, fire reports and dispatching men to fires.
4. Officers on adjoining units contact each other frequently with a view to obtaining a mutual understanding of the problems of each.
5. Perfect arrangements under which the most available man will go immediately to any fire that breaks out, regardless of jurisdiction, and will take charge until the arrival of the officer having jurisdiction over the area.
6. Arrange for the exchange of overhead in cases of emergency.
7. Criticism of the efforts of cooperators in fire prevention and suppression work shall be constructive only and made directly to cooperators themselves and not to the general public or parties not directly interested. Sarcastic criticism is injurious to cooperation and must be consistently avoided.

### *Inter-Regional Cooperation*

The Regional Office shall take such action as may be necessary to crystallize the following suggestions into written agreements with adjoining regions:

1. Improvement Plans.

In the development of improvement plans for any forest, whether for communication, road and trail or other protective improvements, the technical boundaries will be disregarded and the plans for adjacent forests so developed that when construction is completed the resulting improvements



will be such as to give adequate service to either side without duplication of effort or duplication of cost. To do this will require that adjacent Supervisors be wholly familiar with the aims and objectives of each other and that they consider these objectives as of equal weight with their own when working out improvement plans for areas adjacent to the boundaries.

## 2. Fire Control Plans.

(a) In the development of detection plans technical boundaries will again be disregarded and for adjoining areas the final selection of detection points within each area should be that which will give, at the least cost, the acceptable standard of detection service for both organizations. Here, again, it will be necessary that each Supervisor be wholly familiar with the objectives of the other and treat these objectives as his own.

(b) Plans for exchange of smokechasing service should be pre-arranged between adjacent Supervisors and each should thoroughly understand upon just what areas and under what circumstances such service may be expected from the other. This will require that there be at all times a clean-cut understanding by both parties of the fire control plans of each.

## 3. Fire Suppression Action.

It should be the policy of either region to hit a fire on the other side of the regional boundary at any time it is believed that by so doing quicker control of the fire will result. It should also be the policy to hit such fires with sufficient force to gain control within the first burning period. If unable to hit with this degree of force, the attacking region should hit with all available force and immediately inform the other region as to the forces sent and the additional forces believed to be necessary in order to gain control within this time limit. In this latter case, and at the time such information is transmitted, agreement should be reached between Supervisors or their representatives as to which region will provide the remainder of the forces needed.

Officers initiating action on a fire in another region should remain in charge until a representative of the other region arrives and becomes familiar with the details of the job. This accomplished, they should then turn direction of fire control over to this man.

It should be a matter definitely understood that forest officers, protection employees, and improvement employees on fire duty within the territory of another region should be relieved from such duty by the region to which such service is rendered at the earliest date possible, unless there is a definite pre-arranged agreement to the contrary.

## 4. Personal Contacts and Relationships.

Supervisors of adjacent forests should see to it that their forest personnel has a workable degree of familiarity with the organization plan, communication system and the transportation system of their neighbor and should also

see to it that adjacent District Rangers visit the territory of each other and become reasonably familiar with it. Fire plans should be regularly exchanged each spring and any changes in plans made by one Supervisor should be immediately reported to the other. Inter-Regional Supervisor and Ranger conferences (between adjoining forests or groups of forests) should be held at intervals of not more than 2 to 4 years.

Whole-hearted cooperation can be obtained only when there is mutual confidence and respect. As an aid toward the upbuilding of such a feeling critical discussions of differences in policy should be refrained from by field men. Each should recognize that the practices of the other are governed by higher authority and that both are endeavoring to the best of their ability to carry out the programs as laid down for them. Any questions concerning the appropriateness of action or results attained should be taken up through the Regional Offices.

### *Inter-Forest Cooperation*

Inter-Forest cooperation within R-4 will include the same general requirements listed above under inter-regional cooperation, and in no case fewer requirements. Technical boundaries will be disregarded and plans developed that will result in the greatest combined benefit for all units. The maximum cooperation in all phases of fire control will be expected. Where a fire on one forest threatens an adjacent forest, officers on the adjacent forest will cross the boundary and meet the fire rather than wait for the fire to come to them. If they would keep it off their own forest, they should give any help they can to control it on the forest of origin. Direct methods of suppression will apply in such cases, if possible.

It will be standard practice to have one responsible head for inter-forest project fires, preferably someone with the title of Assistant Regional Forester.

On smaller fires the Supervisor of the forest of origin will be responsible for the combined suppression action. This will apply to any fire until the Regional Office has instructed or taken action otherwise.

### *With Local People*

Supervisors will initiate such action as is necessary to secure full cooperation with forest users and their employees. This should be sufficiently definite as to eliminate all doubt on the part of the user and his employees as to how to proceed in fire control work. It is believed that we can go much further in obtaining, encouraging and correlating this method of cooperation, than has been the case heretofore.

In dealing with cooperators a great deal of tact should be exercised especially by dispatchers or others who have to call on these agencies for assistance during a fire outbreak, in order to secure their whole-hearted contribution.

Whenever cooperators, such as members of U. S. B. S., volunteer services on a fire, they should be relieved as soon as possible so they can get back on their regular work.



## INSPECTION

Inspection of the fire control organization has two primary purposes: (1) Determination of the extent to which delegated jobs have been accomplished, and (2) to secure the stimulus of personal contact and personal instruction.

Inspection should be made in accordance with a coordinated plan which shows where inspections are to be made, when they will be made, what information is to be secured, and by whom.

The use of detailed notebook forms or outlines for inspection is approved, to be used at least as a tickler list at the time of inspection. Care must be taken to see that outlines are revised frequently to insure conformity to changes in policy and proper relative emphasis on different activities. Inspection of fire control activities and fire control improvements should be correlated with inspection of other work in order to reduce travel time to a minimum.

As a standard requirement, the Supervisor or Assistant Supervisor will be expected to spend annually at least one week with each ranger in the field and will arrange his travel so as to inspect at least seventy-five percent of the guards at their stations on each ranger district annually and all guards on all districts at least once every two years. The Supervisor or other member of his overhead will each season inspect at least one Class C fire on each ranger district, providing such fire occurs, and a sufficient number of Class A and Class B fires to allow a good check on the action taken and the efficiency of the force in fire suppression work.

At least 10 percent of all Class A, 25 percent of all Class B, and 50 percent of all Class C fires will be inspected each season by the forest overhead.

Rangers will inspect every man in their protection organization at least once every thirty days. New guards, or guards of some experience whose efficiency is in doubt, will be inspected within ten days after placement. A follow-up inspection will be made within ten days after the first inspection to determine the extent to which the guard understands his job and is following instructions. Where material inefficiency or disregard of instructions is noted, at that time the guard should be replaced.

Rangers should check efficiency of their men in fire suppression work by inspecting at least 25 percent of all Class A fires, 50 percent of all Class B fires, and all Class C fires on their districts.

## GUARD INSPECTION

Name of guard..... Years of service.....  
Location..... Forest.....  
Training: No. of camps.....  
Inspector (initial and date).....  
Personal appearance.....  
Physical ability to perform duties.....  
Mental ability to perform duties.....  
Condition of station (buildings, fences, etc.).....  
Conditions of equipment, ready to go: Fire packs..... Fire tools.....  
Auto..... Horses up..... Riding and pack equipment.....  
Food supplies..... Written instructions.....  
Are they being followed..... Knowledge of unit.....  
Diary, fire and other reports.....  
Job list and work plans.....  
Cooperation.....  
Knowledge of hazard.....  
Improvement work, performance.....  
Performance on fires.....  
Performance on patrol.....  
Lookout duties..... Eyesight.....  
Knowledge of visible areas. Peaks, drainages, etc.....  
Knowledge of false smokes.....  
Reading and using fire finder.....  
Reading and using map.....  
Judging size of fire.....

(Use extra sheets if needed to elaborate)

The above form will be printed in notebook (874-C) size and made available on requisition.



### SECTION III

## FIRE SUPPRESSION POLICY

*Forester's Fire Policy Letter of May 7, 1935*

### "FIRE SUPPRESSION POLICY"

"The approved protection policy on the National Forests calls for fast, energetic and thorough suppression of all fires in all locations, during possibly dangerous fire weather.

"When immediate control is not thus attained, the policy then calls for prompt calculating of the problems of the existing situation and probabilities of spread, and organizing to control every such fire within the first work period. Failing in this effort the attack *each* succeeding day will be planned and executed with the aim, without reservation, of obtaining control before ten o'clock of the next morning.

"I am confident that the sum total of costs plus losses of all classes will be lower in the long run under this policy than they have been under comparable conditions heretofore."

*Forester's Fire Policy Letter of May 25, 1935*

"First of all, the policy gives new emphasis to the established policy of keeping fires small. The very best handled fire is the one which is kept from occurring at all. Next best is the fire which guards and other personnel handle with such speed and trained competence that the fire is quickly put out, and immediate control is secured of 'all fires in all locations during possibly dangerous fire weather.'

"Beyond that point the policy is new and embodies important changes. It includes all National Forests in its scope. It emphasizes rapid suppression of all fires. In these respects it treats all areas on an equal basis. It eliminates our current appraisals of tangible forest values, of themselves, as the basis for differing intent and driving force in fire control. It simplifies both the making of key decisions on the ground, and the inspection and review of suppression and presuppression action.

"It does not say nor imply that needless over-organization in either suppression or presuppression should be tolerated by Forest Officers.

"We have just finished one standard half-decade fire period and are just beginning a new half-decade. The adoption of this policy gives us a chance for experimentation on a continental scale. In some Regions, it represents a departure from traditions and habits of the past and as we make it a clean-cut and uniformly applied departure we will have a fine opportunity to make statistical and other comparisons between the half-decade just closed and the half-decade just starting. At the end of each year of the next half-decade we may, by needed allowance for differences in area and in climatic and other conditions, make illuminating comparisons to determine the effect of the new policy on the average annual tangible damage of \$1,268,014 for all National

Forests and the average annual loss of area of .21% of the last 5 years.

### *"Calculation of Probabilities"*

"One of the important things to understand in applying the policy is its dependence on the techniques of calculating the probabilities. This process constitutes one of the high arts of fire suppression. No comprehensive statement of this technique is appropriate here but attention must be called to three indispensable steps without which 'calculation of the probabilities' cannot be said to exist in the history of a fire. These steps are as follows:

"1. A judgment determination by the best qualified available man as to the number of chains which there will be in a perimeter of the fire as it will be at the end of the work period in question. (For his own protection the man making this judgment determination would do well to record his conclusion when he makes it. It should be entered in his diary or in some other record which will be available when the history of the fire is reviewed.)

"2. A judgment determination by the best qualified available men as to the average number of chains of held line which can be secured per man (with due regard for machinery to be used) during the time between arrival of the crew and the end of the work period in question. (The man responsible should write this down also for his own protection.)

"3. The third step is simply to divide the number of chains in the perimeter of the fire as it is expected to be at the end of the work period, by the chains or fraction of a chain of production to be expected per man in the interval between arrival and the end of the work period in question. The quotient is the size of the organization required to comply with the demands of the Forester's policy.

"Thus when a responsible officer is planning the organization required for a given fire, if there are three hundred chains to be worked before the end of the period and he can get one chain of held line per man by that time, a three hundred man organization is required.

"There is nothing new about this technique for calculating the probabilities. It has been known for twenty years and used more or less. No other method is known which will replace it in complying with the Forester's policy and unless it is used the man responsible cannot successfully assert that his management of a fire job complies with the approved suppression policy of the Forest Service.

### *"Important Points to be Noted in Connection with Calculation of Probabilities"*

"The technique for calculating the probabilities cannot be applied as required by the Forester's policy without some preliminary work. Thus a fire might occur next summer in some well-populated country and burn so rapidly in its first run that proper calculating of the probabilities would call for mobilization of eight hundred men during an afternoon and night. There might be thousands of men with competent overhead who physically could be mobilized but because no advance arrangements had been made, only four hundred men might be delivered on the fire during the first work period. The



man responsible for such a failure to comply with the Forester's policy cannot plead inability to mobilize the required number of men with the requisite speed if he has been prevented from doing so only by failure to make appropriate preliminary organization arrangements. The minimum requirements for preliminary organization and other arrangements include at least the following:

"A. Before the season begins, determine the largest fire fighting organization likely to be required by the worst probable situation during the coming season in the territory in question.

"B. Up to the limit of physical possibilities, make advance arrangements so that this maximum organization with its required overhead can be assembled promptly if needed.

"If the maximum number of men which may possibly be needed in a ranger district or forest is one thousand but there are only five hundred men possibly available without going to far-distant labor centers then the man responsible in the event of a fire has satisfied the first requirements of the policy if he mobilizes immediately five hundred men even when 1000 are needed.

"C. In addition to determination of the maximum number of men who may possibly be required and the maximum number immediately available for the first work period in any fire unit, there must be determined the total possible organization required for the second, third and fourth work periods. This must be done against the possibility that unexpected weather conditions will frustrate properly determined judgments as to size of organization needed for the first, second and third periods successively. This aspect of the matter may require consideration of the physical possibilities of bringing men from remote labor centers in the event of failure to get the fire during the first, second or third work periods.

#### *"Fire Management Hitherto Acceptable now Subject to Criticism"*

"The new policy means that many things which have hitherto been acceptable in the management of fire jobs will hereafter be in violation of the approved policy and subject to criticism. In our discussion of the subject in the meeting I referred to various fires where previous executive action has been regarded as more or less acceptable which in future would be distinctly open to criticism.

#### *"Final Points to be Noted Particularly"*

"Strong emphasis has been placed on the necessity of using CCC or NIRA men in fire fighting whenever they are available. This policy should be continued.

"If you dislike to use men in considerable numbers with the waste which inevitably accompanies large increases in the size of fire fighting organizations, the remedy is to attack the problem of producing more than the usual amount of held line per man hour. I am unable to regard our customary standards of held line production as due to anything but our own deficiencies

as students, organizers and executives. We have made some headway in the development of machine tools which are of great importance in the speeding up of held line construction and for increasing the output of held line per man hour. But when it comes to the techniques of organizing and managing men for a high speed hand tool job of line construction I must admit that my feeling is that we are much nearer to where we were in 1910 than to where we ought to be today.

"Prompt demobilization after corraling can do wonders to keep FF costs down. Some of the highest arts in fire suppression are involved in (a) decisions as to what mop up work to do, (b) executive skill in crowding mop up and (c) decisions as to cutting down the crew as danger diminishes after corraling and mop up."

### *Extra Period Fires*

1. All A, B and C fires which are not corralled before 10 a.m. of the day following discovery shall be reported as Extra Period Fires. (It is recognized that under certain circumstances the occurrence of an Extra Period Fire does not necessarily reflect discredit on a Region.)

2. If a fire is corralled before 10 a.m. of the day following discovery but a live unworked spot fire is discovered *after* 10 a.m., the original fire must be reported as an Extra Period. (This was agreed to at Spokane.)

3. At Spokane the question was asked, "When is a lightning fire a fire? Many lookouts witness lightning strikes and flare-ups, but no fire is ever found." The answer is that when a lookout man sees flame or smoke and the fire is afterward found, the observance of the flame or smoke by the lookout man constitutes discovery. If no live fire is ever found where the lookout man has seen flame or smoke, then there was no discovery of a reportable fire.

4. With respect to the usual classification of Extra Period Fires at the end of the season, it was agreed at Spokane that the heading "extreme weather" should be dropped. It was argued that occurrence of extreme weather should be anticipated and commensurate plans should be formulated and executed. It was also agreed that "inadequate planning" should be adopted as a substitute for the classification "extreme weather conditions" as a cause for Extra Period Fires. An additional item "Searching for small fires and lightning strikes" should be used to cover cases where small fires were not found within first period.

5. The Board of Fire Review considers discovery by outsiders as starting from time report is received by a member of paid Forest Service, per diem or cooperator, force who has responsibility for action.

### CORRELATION OF EFFORT, SUPERVISION, INSPECTION, AUTHORITY AND RESPONSIBILITY IN FIRE SUPPRESSION

As far as is consistent with the keeping of fire losses and costs to a minimum, it is good organization to require the District Ranger to direct all fire suppression work on his district and the Supervisor on his forest. When there are available men elsewhere on the forest or in the region more able to



direct fire suppression work, there should be no hesitancy in putting them in charge of a large fire at any time for the emergency and in effecting whatever additional changes in organization are necessary for the time to keep losses and costs to a minimum. The District Ranger may have as a normal function direct and full responsibility for fire; but occasionally there is more than one fire of size burning at the same time on a ranger district or on each of two or more districts of a forest. The forest overhead or someone detailed by the Regional Office will, in such cases, have to assist in inspecting, supervising, and getting correlation of effort on the several fires to accomplish fully the maximum in suppression work for the ranger district or forest as a whole.

The ranger should keep in touch with all fires on his district and all sectors of large fires and not get bogged down in one place and get out of touch with the entire situation, unless instructed to the contrary by the Supervisor.

There must be one man on a forest who will assume accountability and be responsible for the work on all fires on that forest; who will go from fire to fire and insure that no fire is neglected. Motor cars, airplanes, the telephone and messenger service will be used to whatever extent is necessary to enable this man to keep in touch with the fire situation on the whole forest and to correlate the work of suppression of all fires on the forest. This man must avoid remaining long in one camp or on one fire or on any sector of any fire to the neglect of other sectors or other fires. He must keep moving. Ordinarily this man will be the Forest Supervisor.

The same principle applies with reference to every foreman, sector boss, and fire boss. Each must give attention to all the fire front for which he is responsible and to the entire job of which he is put in charge, and must not tie himself down to any part of it to the neglect of other parts, nor to one crew to the neglect of other crews. Obviously, some fires or sectors or crews will need more attention than others, but each must have its fair share of attention and none will be entirely neglected.

The Regional Office will inspect and correlate fire suppression work among forests when large fires are burning on each of two or more forests at the same time.

Besides the Regional Forester, the Assistant Regional Foresters will have full authority in fire suppression work on the R-4 forests. While they are on the ground they will take such action, give such orders, pass over such authority to others, and assume such responsibility as they see fit. It logically follows that they will be accountable to the Regional Forester for the success or failure of their actions. Members of the Regional Office below the rank of Assistant Regional Forester will receive orders from the Supervisor's office or officer in direct charge of a fire or of fire suppression work.

A Supervisor needing help on fires will notify the Regional Office, stating the position to be filled. The Regional Office will then make the assignment. Supervisors will be furnished a list of available men so that they will have

the best possible information on what can be expected of any one detailed to them for fire suppression work.

## ELAPSED TIME STANDARD FOR FIRST LINE OF DEFENSE

### *Discovery Time*

**The Lookout System:** The lookout system should be such as to make it possible to discover 80% of all fires within fifteen minutes after smoke arises above the cover, for areas of high hazard and with lookouts on duty, during periods of normal visibility. Otherwise the lookout system should be considered inadequate for the area.

**The Lookout Man:** The standards of discovery time set for any lookout man is a maximum of fifteen minutes for all fires after the smoke arises so that it is possible to see it from the lookout. This will mean that the lookout must carefully scan the entire circle at intervals not longer than fifteen minutes.

**Report Time (mandatory):** Five minutes is the maximum allowable elapsed time between discovery of the fire and report by the lookout.

**Get-Away Time (mandatory):** The maximum allowable get-away time set below contemplates the fullest advance preparation practical to reduce get-away time to a minimum:

Foot, 5 minutes, or less.

Horse, 15 minutes, or less.

Auto, 5 minutes, or less.

The smokechaser should report to the dispatcher the last thing before starting for a fire. When the location of a fire is doubtful, as is sometimes the case when but one lookout can see it, it is permissible for the smoke-chaser to delay long enough in order to get a more definite location, and if possible a cross reading from another lookout. Sometimes a smoke is reported in by a traveler who is vague in his description of the location. Try to get a more definite location from any other possible source before starting someone for the fire.

In brief, if it seems probable that by delaying the get-away in order to get a more definite location of the fire, more time can be saved in travel than is lost in the get-away, and thus total elapsed time can be lowered, the delay is proper.

There may be rare cases where delayed get-away is advisable in order to arrange for additional help. Any delayed get-away must be approved in advance by a superior officer if he can be quickly reached by phone.

If it is necessary to go to a fire at all, the promptest practical start will be made upon discovery or report. Even when the hazard is comparatively low, an immediate start will be made, and as much travel done at night as possible. Failure to start promptly for a fire, or failure to travel at night will not be excused. All first line defense men will be equipped with the best available lights for night travel.



## *Travel Time*

Considering the average topography of our highest hazard forests, the following travel time standards are set:

Foot travel on average trails, 2 miles an hour; off trails, average of one mile an hour.

On horseback on average trails and with pack horse, 3 miles an hour; off trails, an average of  $1\frac{1}{2}$  miles per hour.

## GENERAL POLICY AS TO NUMBER OF MEN TO SEND TO A FIRE

Obtain quickest possible action in the initial attack on all fires in all hazard zones and in all cover types; that is, action by smokechaser and such assistance as is estimated will be needed to obtain prompt control of fire.

If for any reason it seems doubtful that the initial attack will be successful, follow-up should be in sufficient numbers and should reach the fire soon enough reasonably to insure its being corralled and held by not later than the beginning of the burning period on the day following discovery or 10 a.m. If not so corralled and held it will be considered a second period fire.

As an aid in determining the man-power needed under different sets of conditions, Tables 1 and 2 have been provided. When the information of any Supervisor will enable him to correct these figures he will do so. These figures should be used only as an aid to judgment in deciding how many men to send to a fire where a follow-up is needed, to meet the standards set forth above. Most fires will be extinguished by smokechasers and the one or two men they will sometimes take with them to the fire. Follow-up will not be necessary. If and when it is recognized that follow-up will probably be needed, then the tables should be consulted to aid judgment in determining the number of men that should be sent to meet the standards set in this Handbook.

First, use Table No. 1 to determine the probable perimeter of fire by 10 a.m. the first day after discovery of need for reinforcements. Then use Table No. 2 to determine number of men needed to build one mile of fire line under the conditions and in the time available. Multiply the number of men needed to build one mile of line by the estimated number of miles of perimeter of fire. This will indicate total number of men needed.

However many men are needed, no more can be used than the number for which transportation, equipment and overhead can be provided. Where time can be saved, men will be walked to fires; and unless other means of transportation are immediately available will carry tools and emergency rations sufficient to last until supplies can be brought in. It is practical to carry at least two days' rations, in addition to tools.

# PROBABLE PERIMETER OF FIRE IN MILES BY 10 A.M. OF FIRST DAY AFTER DISCOVERY OF NEED FOR REINFORCEMENTS

(Based on best available statistical information for Region 4)

	Humidity Period 3 (Deficiency 60 to 120) Time of discovery of need				Humidity Period 4 (Deficiency 120 to 180) Time of discovery of need				Humidity Period 5 (Deficiency 180 or more) Time of discovery of need			
	Up to 2 p.m.	2 to 4 p.m.	4 to 6 p.m.	6 to Mid- night	Up to 2 p.m.	2 to 4 p.m.	4 to 6 p.m.	6 to Mid- night	Up to 2 p.m.	2 to 4 p.m.	4 to 6 p.m.	6 to Mid- night
* FAVORABLE PHYSICAL CONDITIONS	0.50	0.44	0.38	0.32	0.72	0.66	0.59	0.52	1.02	0.96	0.90	0.83
† AVERAGE PHYSICAL CONDITIONS	1.38	1.24	1.10	0.96	1.62	1.51	1.40	1.29	1.78	1.71	1.66	1.60
‡ UNFAVORABLE PHYSICAL CONDITIONS	2.95	2.88	2.82	2.76	3.72	3.62	3.50	3.38	4.46	4.30	4.10	3.90

\* Includes slope less than 30 %, altitude over 7,000, wind less than 5 m.p.h.

† Includes slope 30 % - 60 %, altitude 5,000 - 7,000, wind 5 - 10 m.p.h.

‡ Includes slope over 60 %, altitude under 5,000, wind over 10 m.p.h., undisposed slash and other special hazards.

Judgment will have to be used in applying other combinations of slope, altitude, wind velocity and other special hazards than indicated in the table.

After middle of September, reduce fifty per cent account reduced hazard conditions.

A flat 10:00 a.m. has been set for the beginning of the burning period, without regard to time of year. It is believed more refinement is practical and advisable. Post season fires, which occurred after October 10 in 1936, and into November, cannot be expected to get up and go as early in the morning as fires do two to three months earlier in the season. The sun rises considerably later in October and November. Fires will not begin to burn vigorously in late September, October, and November, a shorter time after sun up, other things being equal, than is the case in July and August. In fact, in all probability it will work strongly in the other direction.



# NUMBER OF AVERAGE FIRE FIGHTERS REQUIRED TO COMPLETE ONE MILE OF HELD FIRE LINE\*

(Based on best available statistical information for Region 4)

Available Work Time on Fire Hours	Easy Construction					Average Construction				
	Br.Gr.	P.P.	Type L.P.	D.F.	S.Alp.	Br.Gr.	P.P.	Type L.P.	D.F.	S.Alp.
2	31	91	67	60	54	35	121	91	85	74
4	16	46	34	30	27	<u>18</u>	60	<u>46</u>	43	<u>37</u>
6	10	30	22	20	18	<u>12</u>	40	<u>30</u>	28	<u>25</u>
8	8	23	17	15	13	<u>9</u>	30	<u>23</u>	21	<u>18</u>
10	6	18	13	12	11	<u>7</u>	24	<u>18</u>	17	<u>15</u>
†12	5	15	11	10	9	<u>6</u>	20	<u>15</u>	14	<u>12</u>
	Heavy Construction					Extra Heavy Construction				
	Br.Gr.	P.P.	Type L.P.	D.F.	S.Alp.	Br.Gr.	P.P.	Type L.P.	D.F.	S.Alp.
2	39	182	133	130	111	43	364	266	266	231
4	20	<u>91</u>	66	<u>60</u>	56	22	181	133	133	116
6	13	<u>61</u>	44	<u>43</u>	37	14	121	88	88	77
8	10	<u>45</u>	33	<u>32</u>	28	11	91	66	66	58
10	8	<u>36</u>	27	<u>26</u>	22	9	73	53	53	46
12	7	<u>30</u>	22	<u>22</u>	18	8	61	44	44	38

Figures underscored indicate normal expected condition.

Number of men includes fire fighters only.

No travel time included.

\*This does not contemplate mopping up completely, but getting the fire corralled to the extent that there is little chance of its getting away pending the complete mopping up. The fire is to be corralled by the time specified on the day after discovery and completely extinguished later.

(A fire is corralled when a line has been completed around it by means of which the spread of the fire is checked or stopped; and controlled when mop-up work has been completed to point of safety.)

Table is based on hand work. If plow is used, reduce above figures by:

Easy construction, reduce 50%

Average construction, reduce 35%

Difficult construction, reduce 15%

†The maximum period on line construction is limited here to 12 hours, in view of the fact that it will usually require some walking to get to fire and because men will have to patrol line and do some other work the afternoon of the day after discovery, granting the fire is under control by time specified. Men will be physically unable to work more than 12 hours on line construction and do the other work mentioned.

Times specified are set as a minimum requirement. More men for quicker action is contemplated when consistent with economical and satisfactory control. Get fire out as quickly as possible.

When a man of experience is placed in charge of a fire the general policy should be to furnish him, as far as possible, at least all the men and equipment he calls for. Other things being equal, the man on the ground is in the best position to say what is needed. But the final responsibility for sending sufficient men and equipment to put out the fire in accordance with the standards provided and without unnecessary expenditures rests with the Forest Supervisor.

## DISPATCHER TECHNIQUE IN DETERMINING NUMBER OF MEN TO SEND TO FIRES

Procedure and technique in Chief's "O-Fire" letter of May 25, 1935, apply directly and require no modification at this time except with respect to fires so small that the method of estimating the perimeter does not seem to apply. To this special class of fires dispatchers should send enough men so that they feel confident that the fire will be corralled during the first work period and held thereafter.

### *Strength of First Attack*

Region 4 fire forests should consult the following tables, merely as a guide, when deciding on the number of men to send to a fire.

TABLE 6

Number of Men to be Sent to Fire Initially									
Brush-Grass*					Douglas Fir				
Travel Time	Humidity Period				Travel Time	Humidity Period			
	1	2	3	4 & 5		1	2	3	4 & 5
0-2 hr.	2	3	3	5	0-2 hr.	1	3	5	10
2-4	3	4	5	6	2-4	2	4	7	12
4-6	4	6	7	8	4-6	3	6	9	16
6-9	7	8	9	10	6-9	5	9	14	25
Over 9	11	12	12	13	Over 9	8	14	18	37
Ponderosa Pine					Lodge Pole and Other				
Travel Time	Humidity Period				Travel Time	Humidity Period			
	1	2	3	4 & 5		1	2	3	4 & 5
0-2 hr.	2	4	9	36	0-2 hr.	1	3	4	6
2-4	2	5	13	50	2-4	2	4	5	8
4-6	3	8	18	60	4-6	3	6	7	10
6-9	4	11	25	81	6-9	5	8	10	14
Over 9	5	16	33	104	Over 9	9	12	14	18

\*For brush-grass fires which threaten a particular timber type, take action indicated for that type. The tabular figures for brush-grass type are for areas along boundaries and outside in which fires are not a threat to timber stands.



The following factors should be considered in estimating the number of men to send for initial attack.

1. No. available men and their location. Also in case of lightning fires, amount and location of reserve necessary to handle other fires.
2. Time of day, season of year, humidity and temperature.
3. The velocity, duration and direction of the wind, and future probabilities.
4. Previous precipitation, cumulative relative humidity and other factors affecting fuel inflammability.
5. Location of fire on drainage or slope, distance to top.
6. Degree of slope, character and exposure of topography.
7. The continuity, size, volume and arrangement of fuels.
8. Work time available and retarding effect on rate of spread as corral action progresses.

Fire dispatchers are expected to use their best judgment on number of men to send to any fire, even if they disagree materially with the figures given in the table above.

To comply with Forester's instructions the following dispatcher sheets 1 and 2 should be filled out for each fire occurring during the main fire season.

*Fire Dispatcher Record (Sheet No. 1)*

Date.....193..... Hour.....M.  
LOOKOUT..... AZIMUTH.....  
Location of fire:.....  
side of ridge, creek, location on drainage, etc.  
.....  
Exposure .....  
How far from some  
prominent point or land mark.....  
.....  
Burning in: Ponderosa..... Douglas Fir..... Lodge-Pole..... Br.-Grass.....  
Size..... Color of Smoke.....  
Wind..... Direction.....  
M.P.H  
SENT..... FROM..... AT..... M.  
SHOULD ARRIVE AT FIRE..... HOUR..... DATE  
SENT FOLLOW-UP: ..... MEN..... FROM..... AT..... M.  
Name of Fire..... Reportable..... Non-Reportable.....  
ADDITIONAL LOOKOUTS REPORTING FIRE:  
Lookout..... Azimuth..... Time..... M.  
Lookout..... Azimuth..... Time..... M.  
REMARKS:

Dispatcher

*Fire Dispatcher Record (Sheet No. 2)*

INITIAL ACTION ON FIRE

(Refer to "Dispatcher's Technique" in Fire Handbook)

- (1) Humidity period..... Name of Fire.....  
(2) Timber type.....  
(3) Number men dispatched.....

FOLLOW UP ON FIRE REQUIRING REINFORCEMENTS

- (4) Time of discovery of need for reinforcements.....M.  
(Hour)  
(5) Humidity period.....  
(6) Altitude .....Feet.....F. Av. Unf.)  
(F. = Over 7000 ft., Av. = 5000-7000,  
Unf. = 5000)  
(7) Slope .....%.....F. Av. Unf.  
(F. = 0-30%, Av. = 30%-60%,  
Unf. = Over 60%)  
(8) Wind .....mph.....F. Av. Unf.)  
(F. = 0-5 mph, Av. = 5-10 mph,  
Unf. Over 10 mph)  
(9) Special Hazard.....F. Av. Unf.  
(Cross out two)  
(10) Manual figure for perimeter at end of first burning period.....  
(Miles)  
.....  
(11) Available work time on fire.....hours.  
(12) Type of Construction.....  
(Easy, average, heavy or extra heavy.)  
(13) Timber type.....  
(14) Number men required to build one mile of line in time available.....  
.....  
(15) (14) multiplied by (10) = Number of men to send.....  
(16) Number of men sent.....

MISCELLANEOUS—GOOD PRACTICE

Do not walk fire crews long distances to work. If impossible to find water close to the fire, make dry camps and pack or haul water to them. Usually such camps will only be necessary to fill in between camps where water is abundant. Keep the number of men in dry camp to the minimum needed. Usually 10 to 25 is sufficient to fill in such a gap. Two or three miles apart is a good spacing for fire camps, where men have to walk to and from work. Where auto transportation is available to take crews to and from work, camps may be as much as ten miles apart.

As a rule, from 100 to 150 men is the maximum for any one camp, and then only when automobile transportation is available, since it cuts down



overhead and delay in assembling men when and where needed. From 25 to 50 men are as a rule the maximum to keep in one camp supplied by pack strings.

Once the crew is organized each straw boss should designate a parking place in the camp or on the line where the tools for his crew should be placed at the end of the work shift. An inexpensive rack can be made by setting two posts and nailing or tying a pole on each side about 3 feet from ground. Unless it is necessary for night crews to use the day shift's tools, all tools should be brought to camp for reconditioning, and so that they will be on hand for use wherever the crew may be sent.

Where lounging fires are needed they will be provided for the crews mornings and evenings to keep the men away from the cook's fire.

Keep a night watchman in camps on roads, in settlements and places accessible to the general public. He will keep the camp quiet, answer the telephone, call the cook, packers and bosses, sharpen tools, police camp and do other duties.

If fires are running in settled country or crossing traveled roads, post guards and close roads to stop travel and avoid danger to lives.

If a refugee problem develops, call on the County and State Red Cross organizations to take it in hand.

At headquarters camps or camps that are going to be at the same location for one week or over, get in flies to shelter supplies.

In sending crews to fires away from roads make arrangements for competent guides for men and pack strings. First crews should leave markers for others to follow.

In the past, we have been too prone to keep agitators and loafers when men are badly needed. Get them out of camp and off the job as soon as possible.

Allow no smoking outside of fire lines, except in camps. Infraction of this rule after due notice will result in prompt dismissal.

Ordinarily men should not be hired for fire-fighting who are under 18 or over 50 years of age.

## PROTECTING MEN ON FIRE LINE AND IN CAMP

In fast running fires, particularly in slash, heavy brush, down timber and in crowns, there is always danger of crews of men being cut off, hemmed in or overtaken by the fire wall.

Fire bosses and foremen should be alive to this risk and have always in mind a clear-cut plan of action to be followed in case a fire "goes bad." It is an important part of their responsibility to size up the possible risks and have a plan in mind of what they are going to do with their crew in case of emergency.

The boss must, above all things, keep cool or at least have the self-control to appear cool and calm. Levelheadedness is a fundamental factor in such cases. He must get his men together, give them their instructions, tell them nothing that will unnecessarily excite them, and above all keep them together. If any break away to follow their own ideas, get them in hand, but don't risk the lives of the rest of the crew. Have men keep hand tools with them, especially shovels. These tools may be of great value in protecting the men. Any water that can be taken along may be very useful.

The safest place is often behind the fire front on the burned over area. Generally there are some places on the advancing front where fuel is thin and heat and smoke not intense enough to prevent men getting through by a quick dash, and even though it may be hot, the burned-over area is safe if it has crowned out, and the burned-over area is often the best bet even if the surface alone has burned. Instruct men to take a deep breath and hold it while dashing through flame and smoke. A wet handkerchief or wet shirt sleeve held over the mouth when water is available is insurance against breathing in flame and smoke.

If there is no chance to get behind the fire front and it is necessary to move men away from fire over unburned territory, remember that men can travel downhill faster than they can travel uphill and that a fire travels uphill faster than down. Do not travel ahead of a fire in the same direction that it is spreading fastest unless it is known that there is some safe place ahead that positively can be reached by the crew. When it is not possible to get within the burn, it is better to "side step" or flank the fire and get men to one side of the advancing front by traveling parallel or obliquely to the front, than to try and outrun the fire. In getting away from a fire, pick the most open ground possible and avoid dense tangles where travel is slow and where men may become separated and thus go astray. Remember also that suffocation is a greater risk than heat, and instruct men to keep damp clothes over their noses and to stoop low and breathe the air next to earth. If there is no possibility of getting away from the front of a fire, get the men to water if possible.

Men have lived through bad fires by burying themselves in mud holes or lying in small streams, with only nose exposed and that covered with wet cloth to breathe through; getting into tunnels and lying there flat on the ground; and one instance is known where men lived through in a green circular alder patch of about one acre (240 ft. across). These were last resort cases and are mentioned only as such. If the man in charge keeps his head, keeps alert to what the fire is doing, keeps an up-to-the-minute plan of get-away action in mind, and then acts decisively and promptly when the crisis is imminent, last resort measures likely will never need be used. Have a plan either for getting into burned-over area or "side-stepping."



If crews are in a dangerous place on the fire line when the bad burning period of the day is beginning, the fire boss should plan out his line of retreat, watch the action of the fire closely, and if it shows clear signs of blowing up and there is no nearby safe place to take the crew in case of a blow-up, he should take them back down the line at once to a place of safety until the danger period is past. It is a poor general that allows his way of retreat to be cut off, and strategic retreats are at times as necessary in fire-fighting as in war. Be prepared for emergencies.

But as a matter of fact, aside from the spectacular catastrophe of 1910, more men have been killed or seriously injured through accidents occurring in line construction and mop-up work than from flames and smoke. There is an ever-present risk from falling timber, falling limbs, rolling logs, and rolling rocks that calls for constant watchfulness on the part of foremen and straw bosses. The line worker, from the nature of his job, must depend for his protection upon the watchfulness of the boss.

The more important dangers are:

1. Careless felling of trees.

- (a) Failure on the part of sawyers to shout a warning as a tree is about to topple over.
- (b) Felling of trees into other trees without due warning as to the number of trees or snags that may be knocked down thereby.
- (c) Carelessness in bringing "lodged" trees to earth.
- (d) Failure to keep track of the location of other nearby workers.
- (e) Failure to be on guard against "kick-back" of a tree when severed from the stump.

2. Failure to watch the action of burned or burning snags: (Remember that a snag burned off at the ground or higher up usually makes little or no noise until it strikes the ground.)

- (a) Failure to watch the effect of wind action on snags or green trees that have burned around the base, and to spot the dangerous ones.
- (b) Failure to spot badly weakened snag tops.
- (c) Failure to size up the consequences of a falling snag (flying limbs or chunks of wood or felling of other snags).

3. Rolling logs on steep slopes.

- (a) Those burning off.
- (b) Those started by the natural falling of trees and snags.
- (c) Those resulting from action of men.

4. Rolling rocks on steep slopes.

- (a) Those started by burning out of their supporting material.
- (b) Those started by falling snags and trees.
- (c) Those started by the walking of men or animals.

5. Careless handling of edged tools.

- (a) Axes glancing or hanging on overhead limbs.
- (b) Saws—men falling on them or men being hit by a carelessly carried saw.

6. Infection resulting from:

- (a) Blistered feet.
- (b) Carelessly dressed or undressed minor wounds.
- (c) Burns or scalds.
- (d) Insect or snake bites and stings.

7. Illness from:

- (a) Lack of sanitation.
- (b) Too free use of water.
- (c) Tainted food.

These dangers are enumerated here in order that they may the more surely be avoided.

## ORGANIZATION OF SUPPRESSION FORCES

Time and money will be saved in fighting fire and acreage burned kept to a minimum when fire suppression forces are carefully and closely organized under a fire boss, foremen, straw bosses, etc. This organization must be effected as soon as is practical after the fire suppression forces have been hired and assembled, and at the latest, as soon as they reach the fire camp or fire.

It will greatly help if overhead from straw bosses up have been selected and arranged for previous to the fire. Otherwise, there is little assurance that a sufficient number of satisfactory men will be obtained for these positions.

The following chart should be followed in organizing crews, as closely as available help and pre-season preparedness make such practice possible. In order that friction may be minimized and the duties of the various overhead positions of the suppression force may be more fully understood, the following chart and job descriptions have been prepared, briefly setting forth the duties and responsibilities of such overhead jobs.



# ORGANIZATION OF SUPPRESSION CREWS

No.	† 10 to 20 Men	No.	21 to 40 Men	No.	41 to 60 Men	No.	61 to 90 Men	No.	91 to 130 Men
	A		B		C		D		E
1	Fire Boss	1	Fire Boss	1	Fire Boss	1	Fire Boss	1	Fire Boss
1	Cook	1	Foreman	2	Foremen	1	Scout	1	Scout
1-2	Straw Bosses	1	Cook	1	Camp Boss (He will act as time-keeper also)	3-4	Foremen	4-5	Foremen
		2	Flunkies			1	Camp Boss	1	Camp Boss
		3-5	Straw Bosses			1	Timekeeper	1	Timekeeper
		1	*Plow Unit	1	Cook	1	Cook	1	Cook
			(Time kept by Fire Boss)	2-3	Flunkies	4	Flunkies	1	Asst. Cook
				5-8	Straw Bosses	8-11	Straw Bosses	4	Flunkies
				1-2	Plow Units	2	Plow Units	11-16	Straw Bosses
		1	To gather fire cost data	1	To gather first cost data	1	To gather fire cost data	2-3	Plow Units
								1	To gather fire cost data

\*One man to handle plow horse and one to hold plow. A third man will often be needed with a pack horse to pack water for plow crew and plow horse, and to help plow crew otherwise. One man of plow unit will be a straw boss.

†These numbers represent the rank and file of fire fighters on the fire line and do not include any of the overhead mentioned.

Pump operator to be provided for each pump whenever pumps are used on a fire. For 600 feet of hose four men are usually necessary: (man to run pump; one at nozzle; one to help handle hose; one to stir up duff, turn logs over, etc.). Add one man for each 200 feet of additional hose in use.

When there are two shifts of fire-fighters, some change in organization will be necessary. Suppose a total of 40 fire-fighters to be divided into two shifts of 20 each. Use Column A for each shift, except but one fire boss will be necessary for the two shifts and but one cook. However, an assistant cook should be added. One man should be in charge as cook for the 24-hour period, though actually on duty but part of that time. He should instruct the assistant cook who will be on the night shift, though shifts will overlap somewhat.

## *Fire Boss*

The fire boss is the man in charge of all men and operations on a project fire. He should be a man (a forest officer if possible) experienced in handling large fires, and one who has proved his capacity. He must know how to handle men and fight fire.

While acting in the capacity of fire boss, any officer, regardless of his title or rank, will have full authority and responsibility for directing all operations on the fire.

Ordinarily, when no more than 20 men are employed, he will combine in himself all the duties of fire boss, camp boss, fire scout, timekeeper and foreman.

The fire boss, on arriving at a fire, must determine the site for camp, or have it done, so as to have it reasonably safe and so as to keep travel time between camp and fire to a minimum, organize his men, get the earliest practicable size-up of the fire to determine the initial attack and general strategy and methods of suppression. He will keep constantly informed of the progress of the fire and of the suppression work, using scouts and messengers when necessary. He must leave full instructions as to where to start work for men who may arrive on fire line during his absence.

He must keep the dispatcher fully and promptly informed of the progress of the fire and his needs for men and supplies. Need for men should be anticipated and orders placed early in the day when it is practical to get them. After reinforcements are sent in and a total of ten or more men are on the fire, the fire boss should not rely on further action being initiated by the dispatcher on lookout reports, but such action will be initiated by the dispatcher, if he has sufficient information. The use of any necessary men for messenger service is good practice, even when men are badly needed on the fire. (This does not annul the rule that the first man to the fire must not leave to call first reinforcements, but depend on lookouts and dispatcher.)

He should decide early as to whether he has a sufficient number of men to get the fire under control within the time standards in effect, and should order more men if necessary to meet those standards. He will see to it that provisions, equipment and tools are supplied as needed, and that the latter are kept sharp and in repair. He will have plows and other power equipment used to the greatest practical extent. He will have all work on the fire supervised and inspected so as to get the work done to the right standard and where most needed, and to insure the highest practical efficiency. He will have satisfactory meals served at the time decided on by himself and will see that lunches are prepared at the proper time to avoid delaying the start of fire fighters for the fire. He will decide on hours of work and see to it that these are observed. He will determine the division of men into shifts and the number for each shift. He will take prompt and proper action relative to fire fighters, straw bosses, foremen, and others to get better results when there is inefficiency. He will see to it that all his subordinates are fully informed as to their duties, furnishing them with any



written instructions necessary for the purpose. He will have all necessary records kept. He will take prompt action in reducing his forces when the fire is under control and when it is safe to lay off men.

He must coordinate all work in order to insure the fullest use of new and improved equipment, and the most effective methods and distribution of men specially fitted for special kinds of work.

The fire boss or ranger will keep a complete and accurate record of all action taken on the fire; time of arrival of men, and numbers, distribution of men on line by days, and general plan of attack followed. He will also keep the form "Estimated Perimeter in chains of fires larger than 50 acres." These records will be kept daily if time permits. If the demands of the work prevent a daily record, it will be worked up immediately after the fire is under control.

Work for the following day must be planned each night, and adequate instructions given to sector bosses and foremen.

### *Fire Scout*

A man who assists the fire boss in keeping track of the changes and progress of the fire. Should preferably be a forest officer and an experienced fire fighter, familiar with the locality, able to locate and recognize advantageous points of attack, and to describe intelligently the location of the fire and type of forest cover in which it is burning. This is a good training position for a forest officer who has the other qualifications, but lacks experience as fire boss.

He may:

1. Locate available water supply; select new camp sites ahead of operations.
2. Guide crews or packers to new camps or fresh points of attack.
3. Determine and map the character of the country ahead of the fire, the location of the fire, perimeter and location of spot fires, ahead of the crews.
4. Act as messenger for fire boss.

A scout will only be needed when the size of the fire is such that the fire boss is unable to keep in touch with all sections of the line personally.

Should use messenger when necessary to keep fire boss informed. Should be a good hiker.

### *Sector Boss*

Whenever possible should be an experienced forest officer working under the direction of the fire boss. Directs operations on one sector of the fire. Remains on sector of the line for which he is responsible.

Duties on fire line practically the same as fire boss, except that they apply to one portion of the line only. Will have charge of two or more foremen.

### *Foreman*

He will be in charge of one crew working out of a fire camp; in charge of a certain section of line; in charge of line patrol and mopping up or any

other definitely described part of a fire operation. His qualifications should approach those of a sector boss. The portion of the job for which he is responsible should be clearly defined by the fire boss or sector boss. One foreman for each 25 men is sufficient. For crews up to 20 men, the fire boss will act as foreman, generally.

Subject to any modifications made by his immediate superior, a Foreman should:

1. Understand thoroughly what the fire boss wants done and how he wants it done. Keep fully informed on fire conditions and what fire can be expected to do. Plan daily in advance and lay out the work of his crew and section. Decide as to the kind of work needed on the section and see to it that it is accomplished promptly, correctly, and without unnecessary work. Know the standards and policies for location of fire line, clearing, trenching, burning out and backfiring, patrolling and mopping up, and see that these standards and policies are observed.

2. Personally instruct straw bosses in the proper methods of doing the work assigned them, including organization of mop-up crews.

3. See to it that his straw bosses have crews well-balanced as to axemen, sawyers, mattockmen, plow unit, etc., and that each man is provided with suitable tools and equipment.

4. Personally direct the activities and work of the straw bosses assigned to him. Exercise genuine leadership and make every effort to have real production obtained from the men available on the job.

5. As instructed by fire boss, see that adequate provision is made for conditioning, distributing and care of tools and equipment. Have tools taken to camp at end of shift. Hold straw bosses responsible for loss of tools.

6. See that crews get out of camp promptly at time set by the fire boss and make the necessary advance arrangements to that end. Make certain that the time and commissary of his men are properly kept each day.

7. See that suitable lunch and water arrangements are made for the men under his supervision.

8. Report men under his direction to fire boss for disciplinary action for what he deems adequate cause. See that straw bosses get a reasonable amount of work from their men.

9. Know just what is being accomplished on his section at all times, pace off trench construction each day, and report progress to his superior as frequently as practicable. Compare work of crew of one straw boss with that of others.

10. Look after the comfort and safety of his men.

### *Straw Boss*

A straw boss may be placed in charge of a small crew such as axemen, sawyers, plow unit, pump crew, mopping up crew, or any other small crew on a definitely described portion of a fire operation.



Such crews should rarely exceed 10 men, and on such work as patrol or mopping up may include only three or four men.

The straw boss' duties should be clearly and definitely defined by his immediate superior.

A straw boss should:

1. Understand exactly what the foreman wants done, where it is to be done and how it is to be done. Personally direct the activities and work of the men assigned to him, take the lead and set the pace for his gang, and see to it that their task is efficiently and properly performed and that effort is not wasted doing unnecessary work.

2. Personally instruct men in the proper method of doing the work, and train them in proper use of tools when their work shows them to be unskilled.

3. See that his men are properly equipped; that their tools are kept in good condition and kept track of; issue the tools to the men to maintain proper crew balance; have tools taken to camp at close of the day if not turned over to night crews.

4. Know just what is being accomplished on his section or job at all times and report progress to his immediate superior as frequently as practicable.

5. Make suitable lunch and water arrangements for the men under his direction.

6. Recommend to his superior disciplinary action when that seems necessary for men under his direction.

7. Make certain that the time of his men is properly kept each day.

8. Look after the comfort and safety of his men and see that injuries are reported to his superior immediately. The straw boss will keep careful watch to prevent injury to his men by falling trees, rolling stones, etc. He will see to it that wounds and injuries get prompt treatment.

## INSTRUCTIONS FOR PLOW UNIT STRAW BOSS

The man in charge of the plow unit will be responsible for seeing:

1. That all equipment in the unit is properly assembled, cargoad for transportation, and ready for use.

2. That when ordered to a fire it is all properly loaded and taken. Plow outfit will be assembled sufficient to begin work in one horse and two man packs. These should be taken in by the plow crew. The balance can be packed in when other pack stock is available. Only one plow horse per plow will be provided.

3. That when fire camp is reached the plow unit equipment is kept separate from other fire fighting equipment. Plow horses should be kept a short distance down stream from fire camp.

4. That each man in his crew has proper instructions and carries them out.

5. That the teamster takes proper care of his horses and harness. Horses

fed, watered and changed at proper intervals, night herder when necessary, shod, etc.

6. That the plow shaker keeps his plow in repair and his tools properly assembled.

7. That all necessary equipment, tools, forage, water and lunches are taken to the fire line for the day's work.

8. That plow unit keeps up with clearing crew, but not near enough to endanger the lives of the animals and men from falling timber, or to hamper the work of the clearing.

9. He will keep the time of all members of his crew and check them up daily with the timekeeper.

10. He will be subject to the orders of the fire boss or foreman.

### *Camp Boss*

He should be a forest officer, if possible, with experience on fires and handling men on large projects.

He is responsible for organizing and directing the activities in one camp, under the direction of the fire boss. Camp boss should be provided on all fires where 36 men or more are located in one camp. In camps up to 60 men, the camp boss will serve as timekeeper also.

When required, the duties will usually be a combination of clerical and administrative ones and will usually consist of:

1. Arranging camp layout, providing the necessary facilities, maintaining camp discipline, order and sanitation. Keep camp preparation down to the minimum, consistent with efficiency in getting work in camp done, reasonable comfort of the men, sanitation, and suppression of the fire as soon as possible.

2. Act as or assist timekeeper. Settle time disputes and approve time slips when men are released.

3. Supervise storing and checking in and out of supplies and equipment.

4. See that cooking is organized so as to provide for meals being ready and served on time, and lunches prepared and put up so as not to delay the crews in getting out to their work on the fire.

5. Be responsible for the ordering of all provisions and supplies and commissary for the camp, checking these in and seeing that they are taken care of and economically used.

6. See to the prompt repair and sharpening of tools.

7. Answer and transmit all important telephone messages when fire boss not present.

8. Order supplies and equipment when instructed by fire boss.

9. Supervise loading and distribution of supplies by truck, pack string, or other methods from base camps, promptly and as economically as possible.



10. Supervise the establishing, organizing and maintaining of communication system by telephone, radio or messenger.

11. See compensation cases are attended to promptly and proper reports made.

12. See that wood is supplied for cook and men's fires.

When an experienced, capable man is available and when but one man is employed for camp boss and timekeeper, he will have the title and get the pay of a camp boss. However in such cases, this man, unless experienced and capable, will be paid the wages of a timekeeper and not the wages of a camp boss.

### *Timekeeper*

Should be a forest officer, if possible, or someone with training for the job.

Will not be assigned to a fire camp with fewer than 61 men in it. Below this number the fire boss or camp boss will act as timekeeper.

One capable timekeeper can handle a camp of 100 men or even up to 150 men. One to a camp is sufficient.

When serving in the capacity of timekeeper only, he will, in addition to keeping the time of all the men in camp, under instructions of camp boss:

1. Make up compensation for injury reports.
2. Keep record of food supplies and Government property.
3. Handle the personal commissary and see that the proper records are kept of same.
4. Do all necessary clerical work.
5. Serve as telephone and radio operator on small crews and as relief operator on larger crews if he can do so without neglecting other duties.
6. Timekeeper will see that all time disputes are settled and necessary adjustments made on time slips, and O.K'ed before the men leave the camp.

The timekeeper will be held responsible for complete daily time records of all men in the camp or such camps as may be assigned to him.

His first duty will be to list all men in the crew or camp, entering their name, address, position, rate of pay and travel time on a time book or on a time slip. He will examine all contracts of hire and see that the travel time and equipment listed therein is placed on the employee's time slip. He will date and initial the contract of hire and return to employee.

Actual travel time will be allowed in going from camp to fire and return. Travel time allowed coming to fire should be that shown on contract of hire. When men or crews have been sent to fire without contracts of hire or travel time is not shown in contract, the timekeeper shall allow the amount of time for travel it will take from point of travel to fire by the most practical route and method. Men applying at fire camp for work and hired will not be allowed travel time either way. They should seldom be hired at all at camp. Travel time on roads will be based on auto travel.

Time will not be allowed for hours while men are separated from crew, for extra time consumed on account of slowness, or any other preventable cause.

Men discharged for inefficiency or who quit before being released, unless they have been employed for a period of ten days or more, will not be given any travel time either going or coming, nor will they be furnished transportation on the outgoing trip unless it is for the best interests of the Government to do so.

Men who are discharged for inefficiency or who quit after serving more than 10 days and up to 20 will be given travel time one way. After 20 days or more they will be allowed travel time both ways.

Employees who have to quit because injured while on duty or laid off to decrease size of crew are entitled to transportation and travel time both ways.

Full 24-hour days are not allowable, as a rule, after the first 24-hour period, and then only when there is a possibility of controlling the fire within that time. After the first day it will be the responsibility of the fire boss to divide the crew into shifts and such shifts should not be longer than 12 hours. In special emergencies the length of shift may be extended, but such extension of time must be authorized or approved by the fire boss or foreman.

The timekeeper should prepare a stand near entrance to fire camp, and each employee must be made to understand that he is to report to the timekeeper when going on and off shift. Arrangements may be made to have straw bosses or foremen report men in and out.

The various foremen will furnish the timekeeper with the list of men in each crew and check this list and the time given them with the timekeeper daily. The foremen will be responsible for seeing that the men in their charge are checked in and out and that their time is given the timekeeper promptly and correctly.

The timekeeper will report to the fire boss, or some higher officer any time reports made by foremen or straw bosses which he believes should be investigated.

Timekeepers, cooks, packers, truck drivers, clerks, tool grinders, flunkies and bull cooks will be hired and paid on a day basis. No overtime will be allowed. Camp bosses, foremen and up will be hired by the day. Pay schedule for foremen if necessary may be adjusted so that he will receive 10% more than the average daily earnings of his highest paid straw boss who serves through most of the period of the fire.

Unless instructed to do so by someone in charge, timekeepers will not check out of camp fire fighters to report for duty on fire line who are unaccompanied by some straw or other boss.

Laborers sent to fire camp under contract, and who have practiced no deceit, whom the man in charge refuses to employ because of physical condition, will be furnished transportation back to point of employment and be allowed travel time. If they were hired because of their own misrepresenta-



tion, they will be allowed no travel time either way.

A maximum of 8 hours will be allowed any one day for travel by truck, train or airplane. Full time will be allowed for foot or horseback travel.

Timekeepers will be held responsible for issuing commissary supplies to fire fighters and seeing that the proper entry and charge is entered upon the purchaser's time slip.

If no more than one-half hour is taken for lunch while men are on fire line, no deduction will be made on their time slip. Otherwise a deduction of all the time taken will be made.

When an employee is discharged, or quits before the work is finished, the timekeeper will see that travel time is crossed out if necessary to conform to instructions given above.

All time slips should be totaled at end of day or shift.

When an employee is shifted to another camp, the timekeeper will see that all necessary corrections are made in his time slip and will total his time slip up to the hour of leaving, initial it, have employee sign it and instruct the employee to turn the slip over to the timekeeper at the camp to which he is ordered to report.

Region 1, Form F-2 Time Slip (original and duplicate) will be provided in all timekeeper's kits and will be used by the timekeeper. Carbon paper will be used so the duplicate copy will be exactly like the original. All time slips when completed, both original and duplicate copies, will be signed by the employee and the timekeeper. If the forest has a disbursing agent, the original time slip when completed will be given the employee who will present it to the disbursing agent for payment, and the carbon will be forwarded by the timekeeper to the disbursing agent in time to be available for checking when employee presents the original for payment. If the forest has no disbursing agent, completed original and duplicate copies of the time slip will be promptly forwarded by the timekeeper to the Supervisor's office for preparation of pay roll. Time slips will be completed and handled as above whenever an employee leaves a camp, whether transferring to another camp or quitting the job for good. All time slip entries will be brought up-to-date at the close of each day.

### *Cook*

Only one cook will be employed to the camp. He will be directly responsible to the man in charge of the fire camp and will personally direct the work of flunkies. As crew increases, add extra help in way of flunkies rather than an extra cook. If fire fighters are divided into two shifts, and whenever cooks must work day and night, the cook will be given an assistant cook for the night shift.

The cook will be responsible for:

1. The arrangement of his kitchen and keeping it clean and providing garbage disposal.

2. Instructing flunkies and assistant cook.
3. Keeping his food supplies ordered through camp boss and properly stored to prevent waste.
4. Having meals ready and lunches put up by time set by fire or camp boss.

Where delivery of supplies is made by truck, three days' rations for the crew are sufficient to keep on hand; if delivery is by pack train, seven days' supply will be the maximum.

Construct tables of poles or boards so as to provide for serving food in "round-up" or cafeteria style.

Cook and helpers will serve the food and keep all others except the over-head out of commissary and kitchen.

### GATHERING FIRE COST DATA

Better data on fire costs is needed, and a much greater effort should be made to secure it. On fires on which 25 or more men are employed, one man should be assigned to keeping fire cost data in the manner indicated in the form "Record of Fire Line Constructed." This man should if possible be trained and instructed in advance of need, and preferably should be a member of the regular fire organization. If employed for the job, he will be given a wage status not lower than timekeeper or higher than foreman, depending on training and ability. He will have no authority to give orders to anyone on the fire line. His sole function will be to gather fire cost data, and he will be put on no other work.

RS-INT (R-4)

Pf-Rate of line construction

### RECORD OF FIRE LINE CONSTRUCTED

FOREST.....											DATE.....		FIRE.....		REMARKS		
(1) Line construction	(2) Mop-up	(3) Hand work	(4) Plow	(5) Tractor	(6) Pump	(7) Timber type	(8) Ground cover	(9) Slope	(10) Soil condition	(11) No. of days since crew came on fire	(12) No. of hours since crew began work on day involved	(13) No. of men began work	(14) Hour began work	(15) Hour finished work		(16) Elapsed time	(17) Line built (Chs.)

This record is for getting *detailed accurate* information on the rate of line construction rather than the total performance of a crew or crews, *break up the job into its component parts and report it that way*. For example, if a



200-yard section of line is in lodgepole and an adjoining 50-foot section is in a spruce thicket, get the data on each separately. These data will be of more value if 10% of what is available is gotten right than if all of it is gotten in a lump figure. Get samples of as many classes as possible. Mimeographed forms will be furnished to, or if necessary prepared by the person gathering these data. Use a separate line for each class or entry.

Explanation of headings:

Columns 1, 2, 3, 4, 5 and 6—Check either 1 or 2 only. Check only one of 3, 4, 5 and 6 on each line.

Column 7—Use following classifications: Gr., Br., Sgb., YP, DF, LP, SP, WF, AF.

Column 8—Use following classifications: Grass, needles, huckleberry, bear grass, logs, windfall.

Column 9—Classify as gentle (up to 30%), medium (30%-60%), steep (over 60%).

Column 10—Classify as sandy, gravelly, rocky.

Column 11—Has the crew been on fire 1, 2 or 10 days? Designed to find out loss of effectiveness from fatigue.

Column 12—If crew began work at 4 a.m. and work on the particular section of line, being reported on, was started at 2 p.m. notation should be 10, i.e., 10 hrs. after crew began work that day. Designed to find how effective crews are after a given work period.

Column 13—The number of men working on a particular section being reported on.

Columns 14 and 15—The time that the men referred to in Column 13 began and ended work on a particular section.

Column 16—The difference in hours or minutes between Columns 14 and 15.

Column 17—Length of the section being reported on in chains and decimals of a chain.

Column 18—Not required that this be computed.

Use remarks column freely if will make record clearer. Turn in form to Supervisor at end of fire.

# ESTIMATED PERIMETER\* IN CHAINS OF FIRES LARGER THAN 50 ACRES

Name of Fire	Forest	Year	Month	Day	Timber Type	Altitude	Grazed Condition	General Slope	General Exposure	Wind Velocity	Hour of Day Fire Got to Class C Size

# ESTIMATED PERIMETER\* IN CHAINS AND NUMBER OF MEN ON FIRE AFTER FIRE GOT TO CLASS C SIZE

	1 hour after	2 hours after	3 hours after	4 hours after	5 hours after	6 hours after	7 hours after	8 hours after	9 hours after	10 hours after	11 hours after	12 hours after
Perimeter in Chains												
No. of Men on Fire												

\* In estimating perimeter, use the figure that represents the number of chains of line required to stop fire, rather than the distance around the edge of the fire in detail. Include stretches of dead line which have burned out.

This form of report should be made up after each fire that burned more than 50 acres. Data submitted on fires in a form similar to this has yielded some valuable information, in spite of the fact that the figures were estimates rather than definitely known values. Figures will necessarily continue to be estimates very largely, but if outlines of a fire are plotted carefully on maps from best information available, there is no reason why the estimates should not be accurate enough for all practical purposes.



## LUNCHES ON THE FIRE LINE

Care should be taken to provide as palatable lunches as possible for use on the fire line. It is not easy to provide lunches that will be palatable day after day.

Generally it is best to give each man his individual lunch before he leaves camp. This should be wrapped in paper (paper sacks if possible), and then put into a cloth sack. The latter should be long enough to allow of tying it onto the vest or suspenders without a string so that the lunch can be carried without trouble through the forenoon while the man is at work. It will then be on hand wherever he may be at the noon hour.

The fire boss must see to it that arrangements are made each evening for lunches for the following day. Lunches must be prepared in sufficient time so that fire fighters will not be delayed starting for work on the fire.

Do not set lunch goods before the men and let each help himself. Under such a practice often the last men up would not get their share of some of the more desirable provisions, and the practice of letting each help himself would be an expensive one.

## WAGES AND RENTALS ON FIRE SUPPRESSION WORK

### *Fire Fighters*

The Forester's or Regional Forester's Office will set the wages for fire fighters and other fire suppression positions each spring.

As soon as fire fighters' wages are set, the following rules will apply in determining the wages to be paid for other positions:

### *Straw Bosses*

Straw bosses should be paid 10c an hour more than fire fighters.

### *Line Foremen and Camp Bosses*

These should be paid by day and at a rate 10c per hour more than straw bosses earn in a 12-hour day.

### *Sector Bosses*

Should be paid by the day at a rate 15c per hour more than straw bosses get in a 12-hour day.

### *Timekeeper*

Should be paid by the day so as to earn 15c more per hour than a fire fighter earns per 12-hour day. Where there are no more than 40 fire fighters, the fire boss should keep time and no camp boss or timekeeper should be necessary.

Where one man serves as both timekeeper and camp boss, he will be called "Camp Boss," which will be the case where there are from 41 to 60 men, and paid accordingly, if experienced and capable. Otherwise, he should get timekeeper's wages.

### *Cook*

Paid by the day so as to get same as straw bosses earn in 12 hours, if crew

is less than 60 men. If more than 60 men, to get same as foreman earns per day.

#### *Assistant Cook*

Where one is justified by necessity of a cook being on the job night and day, his pay will be at a rate half way between flunkies and the chief cook.

#### *Flunkies*

Paid by day so as to get as much as fire-fighters earn in 12-hour day.

#### *Tool Grinders, Pump Operators, Packers and Truck Drivers*

Paid by day so as to earn same as straw bosses earn in 12-hour day. Rest of crew with pump will be paid on an hourly basis and at same rate as fire fighters.

#### *Plow Crew*

The teamster in charge of plow horses and plow crew should be paid the same as straw bosses and on an hourly basis.

#### *Pack Stock*

Packers will be required to move from 150 to 200 pounds per animal, depending on trail conditions. Decision as to weight of pack will rest with fire boss or camp boss. If less is taken than amount required, a proportionate reduction in rates of pay will be made.

Rates for pack stock fully equipped with saddles, blankets, alforjas, halters and ropes will be set each spring by the Regional Office. The Boise and Salmon Forests will, without further request, furnish the Regional Office information as to local rates by May 1 of each year. If equipment is furnished by the Government, 75% of the base rate will be allowed. Horses will be kept shod by the packer at his own expense. If full rate is paid, then packer must furnish his own ropes and hobbles and bell and all equipment needed. When pack stock is held for use, a fee of not more than 50% of the base rate will be paid. This contemplates holding the stock before fires or between fires, a measure in emergencies. When stock is held for a day or two now and then during fires, full pay will be allowed. This is in cases only where a forest officer asks to have stock held.

#### *Patrol After Mopping Up Has Been Finished*

May pay by the day. Paying by day may avoid the showing of excessive hours. If paid by day, pay a daily wage equal to amount fire fighters get for a day of a length you desire patrolmen to work, depending on the needs of any particular situation, and the length of day patrolmen should work. Full instructions on this must be given patrolmen.

#### *Wages of Temporary Employees (R. & T. men, etc.) on Fires*

Temporary employees (excepting guards) sent to fires should be paid the regular wages of fire fighters from the time they start to a fire until they have returned to their regular work, regardless of the pay they may have been receiving on their regular work. Obviously if they serve as straw bosses, foremen, etc., they will be paid the standard wages for such positions.

#### *Hire of Automobiles*

Rates of pay for automobiles and trucks will be set each spring by the



Regional Office. The rates set will be overall rates including pay and subsistence of driver, repairs, gas, oil, tires, etc. The owner will be required to assume all ordinary risks. Set rates will not eliminate necessity for getting out bids where time will permit.

Supervisors of the Boise and Salmon Forests will furnish the Regional Office each year by May 1, without further request, prevailing local mileage and waiting rates, and minimum mileage guarantee required for automobile and truck hire for:

	<i>Mileage Rate</i>	<i>Minimum Mileage Guarantee</i>	<i>Waiting Rate Per Day</i>
(a) Touring cars			
(b) 1½-ton pickups			
(c) 1½-ton trucks			
(d) 2-ton trucks			
(e) 3-ton trucks			
(f) 4-ton trucks			

When desirable Supervisors may furnish gas and oil and deduct the cost to the Government from above rates.

Where the driver is not hindered by the forest service from making any mileage he desires, then no minimum guarantee will be considered, and if his regular mileage is less than the minimum set, nevertheless the regular mileage rate will be paid and not the minimum mileage guarantee.

The following form will be filled in and posted by Supervisors at places of employment: (Initial supply of forms will be furnished by Regional Office without requisition.)

FOREST SERVICE  
U. S. DEPARTMENT OF AGRICULTURE  
REGION 4

STANDARD RATES OF PAY FOR FIRE FIGHTING

Fire fighters, per hour	.....
Straw bosses, per hour	.....
Camp boss, per day	.....
Foremen, per day	.....
Cooks, per day	.....
Assistant cook, per day	.....
Flunkies, per day	.....
Packers, per day	.....
Timekeepers, per day	.....
Tool grinders, per day	.....
Pump operators, per day	.....
Packers, per day	.....
Truck drivers, per day	.....
Teamsters, per day	.....
Plowshaker, per day	.....

Charges for meals will be deducted from pay at the rate of.....  
per meal.

### *Conditions of Employment*

Men who are discharged for inefficiency or quit before being released, unless they have been employed for a period of 10 days or more, will not be given any travel time either going or coming, nor will they be furnished transportation on the outgoing trip unless it is to the advantage of the Government to do so.

Men who are discharged for inefficiency or quit after serving 10 days and up to 20 days will be given travel time one way. After 20 days or more they will be allowed travel time both ways.

Travel time both ways will be allowed in all cases where men with satisfactory service are released, regardless of the time spent on the fire.

Travel time in all cases is from and to the point of employment and not the employees' home or other point.

Not over eight hours' time per day will be allowed for railroad, boat, or automobile travel. Travel time in addition to that allowed for train or auto travel will be given for hours necessary to walk from the end of the vehicle transportation to the fire, or from one fire to another.

The Government will not be responsible for personal property.

Hours per day will usually be limited to 12 as a maximum, and no bonuses will be allowed.

Smoking in the woods outside of fire lines, except at camp, will be prohibited.

Pack horses (fully equipped)	\$.....	per day
Pack horses (without equipment)	\$.....	per day
Pack horses (held by forest service), maximum of 50% of rental while in use.		

Packers will be required to move 150 to 200 pounds per animal as required by fire boss or forest officer. Failure to move required amount will result in proportionate reduction in established rates.

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Forest Supervisor

### HOURS OF WORK IN FIRE SUPPRESSION (MEN ON FIRE LINE)

Where there is any material chance that a fire can be put under control by continuous work by a man or men when they first arrive on it, a shift of at least twenty-four hours is reasonable, with time off for meals only. Bear in mind that there will be patrol and mop-up work to do immediately after a fire is under control and there must be men for that. Men who have had a twenty-four hour shift must get some rest and sleep. When a twenty-four hour shift is deliberately planned for, provision must be made for relief at the end of the shift.

On a fire that cannot be controlled in one shift, a shift will not be longer than twelve hours except in emergencies. This twelve hours will include travel time from camp to the fire and back.



Fires generally burn the hardest in mid-afternoon and become the quietest late at night or very early in the morning. Therefore, men must be on the fire line early in the morning. If practical, they will be on the fire line by daylight, and in no case will they leave camp later than daylight. Since fires also usually get much quieter late in the evening than during most of the afternoon, it is desirable to have men constructing trench right up to dark.

If men start work on the fire by daylight, they cannot work until dark without putting in an unreasonable number of hours, unless fire is to be controlled in one shift. To accomplish what has been stated above to be desirable, it will be necessary to provide two shifts of fire fighters for fires that cannot be controlled within twenty-four hours. The first shift should go from camp to the fire before daylight, being on the fire line by daylight and ready to begin work. This will mean during the long hours of summer that this shift will have to leave camp by about 3:30 in the morning, depending on the distance from camp to the fire and the length of time required in travel. If they leave camp at 3:30 a.m., and take an hour off for lunch, they should reach camp in the evening by 4:30, which will make them twelve hours of work. The second shift should leave camp with the idea of working twelve hours and not leaving the fire line before dark, at the earliest, traveling back to camp after dark where practical. Shifts so arranged will provide for actual fire fighting (travel before daylight and after dark) from daylight to dark at least. The two shifts will overlap in the middle of the day, at which time the maximum number of men is usually needed.

When satisfactory lights are available for night work on line construction, and when it seems advisable to construct line through the night, the men will be still divided into two shifts, the first shift starting so as to be on the fire line by daylight, and putting in twelve hours, including travel time. The second shift, in the case of night line construction, will reach the fire line just before the first shift leaves it, and will put in its twelve hours. This will result in neither shift being on the fire line for a period of about an hour or two (depending on amount of travel time) just before daylight. Ordinarily there will be no danger in leaving the fire during that period. A patrol can be left if there is danger. Patrolmen should ordinarily work no more than 12 hours a day.

Even ten-hour shifts will allow some overlap in the middle of the day and may be advisable in some cases, as where a fire lasts over an extended period, and may possibly better be reduced to eight hours. Tired or wornout men will do as much in eight hours as in ten or twelve or even a longer period, and it is a waste of money to pay by the hour for too many hours in a shift. Cost of line construction is exceedingly high in case of nearly all large fires, and too long shifts are probably in part to blame.

When fire fighters work as much as ten or twelve hours a day, it is desirable, if fire conditions will allow it, to have them take an hour off for lunch. When conditions are such that it is desirable they be constantly on the job to prevent fire getting away, they will take only enough time off for lunch to allow them to eat and will take no further time off for rest. When they cannot

be spared from the work longer than is absolutely necessary to eat their lunch, and when not over thirty minutes is required for lunch, no deductions will be made for the fifteen to thirty minutes necessary to eat lunch. When more than thirty minutes is taken off at lunch time, none of the lunch time and rest period will be credited to work.

### MAKE IMMEDIATE RECONNAISSANCE OF FIRE

Immediately upon arrival on the fire, the man in charge must take steps to make a reconnaissance of it. Any fire fighters then on the job should be organized and put to work on what seems, on limited observation, to be the most important section of the fire. Arrangements should be made to have camp set up. The fire boss, upon his arrival, if not satisfied with available information, should make a further reconnaissance of the fire, taking along any messengers who may be needed to carry back information and instructions. No intelligent plan of action in controlling the fire is possible until a good reconnaissance is completed. It must be learned, among other things, where the fire is burning, where it is most likely to give trouble, what it will probably do next, how fast it can be expected to spread, where the need for prompt action is greatest, what sections can be left for later action with the least chance, what firebreaks should be taken advantage of, how the fire should be fought, number of men needed, their assignment and distribution.

Full information must be obtained on all these points daily, until the fire is under control, in order to increase, decrease and keep in balance the organization, and use the men to the best advantage in controlling the fire.

### WHERE TO ATTACK A FIRE

The standard rule is to attack the lead of the fire. Sometimes there is more than one lead. Attack them all at once if you have enough men, or progressively if you have not sufficient crew to attack all leads simultaneously, hitting the side leads first, if there is a chance of being flanked by them. Otherwise, hit the main lead first. Cool down the fire in the lead, since this is usually the place a break is most likely to occur. But there may be hot spots on any section of the fire, and these should be cooled down as promptly as possible if there is danger of a blow-up. This means, among other things, tearing apart windfalls and brush piles on fire or about to catch fire, dirting blazing logs, snags, cat-faced trees on fire and burning stumps. If water is readily available a pump or water buckets will save work. A part of the crew can be put on this cooling-down process at once while the balance are constructing line. The cooling-down process may prevent the loss of some line after it is constructed. The object of attack is to stop the spread of the fire as quickly as possible. We have been too prone to concentrate on line construction, leaving most all the mopping up to follow considerably later; while at times if we start cooling down and mopping up the fire simultaneously with building a fire line, we can save line construction by holding line after it is built.



Like all other rules there are exceptions to attacking the lead. For example:

1. Lightning fires frequently start on or near ridge tops. The timber is fairly open and vegetation thin. The damage being done and the progress of the fire on the lead is not great, but the rear has backed and rolled downhill close to the bottom of a gulch full of down timber, spruce groves, and other highly inflammable material that may mean a crown fire, a blow-up and a lot of hard work. Forget the lead for the time it takes to get the fire cut off from the gulch and keep it out of there.

2. Or a crew may arrive on a large fire during the heat of the day. The lead is going uphill and crowning. The ridge top is the only logical or possible place to stop it. It is dangerous to put the crew close in the lead. The weather conditions and fire behavior of the season up to that time indicate that the lead is going to come to the ground when darkness falls; you time the rate of the advance and estimate it is going to be dark by the time the front reaches the hill top.

If this happens, put the trench along the ridge top with a reasonable certainty of holding it. Put a few of the best men, who can take care of themselves, on top of the ridge and beyond to extinguish spot fires that may blow over. Start the rest of the crew working on the flanks. Have everything ready to hit the lead as soon as it comes to ground that evening.

3. Before deciding to attack the lead of a fire, consider the chance of the fire in the rear working to one side and flanking you if you attack the lead first. In case of likelihood of this, put at least a part of men building fire line from the base of the fire along the dangerous side. If enough men are available to do this and still others to use at the same time getting around the lead or leads, do both. Do not take it for granted that you can afford to cut off leads on a fire and disregard the slow burning rear or sides. The latter may burn slowly until they get to the right place and then rush up a slope with surprising speed. In such a case work on the lead is time wasted.

Particularly on very long steep slopes with a fire burning from the bottom to the top or a long way up, don't camp too high on the mountain, but camp where you can watch the rear and the lower part of the dangerous side particularly, and be in a position to build a fire line below the rear of the fire and along the side if necessary. Where the lower side of the fire is on a natural barrier such as a river, it is a good plan to start your fire line right at the river and work up along the dangerous side, but as stated above, if you can do this and still put a part of your force working on the leads, that will be good business.

It is occasionally advisable not to complete a finished line as work progresses, because to do so may give other portions of the fire a chance to escape. In such cases, build a quick line, below standard, to check the spread, skip the cool or slow burning portions, and get around the fire as quickly as possible. Afterward, complete lines to the necessary standard. This then may well be the order on some fires: (1) First hot spot. (2) Build a noncontinu-

ous quick fire line where most needed. (3) Finish the fire line by connecting all portions previously built. (4) Improve and strengthen all the line and mop-up.

The method to use must depend on the judgment of the fire boss and his knowledge of burning conditions.

### *Spot Fires*

It is of primary importance to hunt out and control any spot fires. They may become large fires and nullify any work done on the main fire if they are neglected. Go far enough back to be sure all spots are found. Establish a lookout to aid in the early discovery of spot fires if possible. Snags which may spread fires across the line or cause spot fires at a distance should be handled early in the game.

### *Handling Burning Snags*

Frequently lightning ignites a lone snag which is reached by suppression forces before the fire gets to the ground. Tall snags often break into many pieces on falling, and these pieces may slide and roll for considerable distances and may scatter fire over a sizeable area. In some cases it will be best to build a fire line on the upper side at least before falling the snag, so as to stop any fire from running uphill when the snag hits the ground.

In some cases it will be well to delay completing falling the snag till late in the evening or night, so as to allow time to put out any fires that may be started, before the bad burning period of the next day.

What action should be taken first, whether the falling of the snag or the preparing of a fire line, will depend on the degree of danger from spot fires from the standing snag as compared with the danger of the fire getting away if snag is felled without a prepared fire line.

### *Spread Fire Fighters Out*

The length of fire line constructed per man per hour is *notoriously* low. It often amounts to but a small fraction of a chain. Among other reasons for small output is that men are too much bunched. This means:

1. They get in each other's way.
2. They gossip excessively.
3. It is very difficult to make sure what amount of work anyone is accomplishing, because no one person is working alone on any considerable length of line.

These things can be improved by scattering men out and where practicable giving them each a measured or designated section on which to work, and getting as far as possible some competition. Thus the unfit, drones and loafers can the more quickly be recognized for what they are and weeded out.

## LOCATION OF FIRE LINE

### *1. Definitions*

Burning out: The firing of a narrow strip or small unburned corner between the trench and the fire, when line is being constructed as close to the



fire as heat and rate of speed will permit, or as close as advisable to save line construction, and where it is practicable to stop the fire with an ordinary fire line. Usually done as trench construction proceeds. Used in connection with the direct and parallel methods of line construction.

**Backfiring:** Setting fire a considerable distance ahead of the main fire after completing a continuous fire line. Most frequently natural or previously constructed artificial barriers, as streams or roads are used in an effort to remove inflammable materials along a strip sufficiently wide to stop the main fire. Seldom used except with fast spreading crown fires, where an ordinary fire line will not stop the spread. Used in connection with the indirect method.

Where to prepare a line from which to backfire: Along open ridge tops it is sometimes easy to prepare a fire line from which to backfire. If safe to do so, fires may be set a short distance down the hill toward main fire to burn to top of ridge and to the prepared line. Much care should be exercised else the backfire may jump the ridge. If not safe to do this, individual trees and clumps of trees may be crowned out beginning at the ridge top or fire line wherever located and working down toward main fire.

Where it is not too difficult to prepare a fire line from which to backfire, it may be good practice to drop a short distance down the slope on the opposite side of a ridge from the main fire to construct a fire line from which to backfire to the top of the ridge. It may be safer to do this and the backfired strip will be more effective in stopping the main fire than if a strip of equal width were backfired on the opposite side of the ridge, because a fire will burn harder and jump farther coming up a slope than it will going down.

## 2. *Direct Method*

This contemplates clearing and trenching practically right against the fire; but even when this method is used to the maximum extent advisable, the line should here and there cut across from point to point of the fire, not following all of the irregularities of the burned area, thus leaving small unburned areas of a square rod to a quarter acre immediately inside the fire line. This may speed up the work of getting around and controlling the fire. *Burn out these corners promptly as the fire line is being built.*

(a) Follow the fire in all cases unless an estimated saving of at least 25% of the expense in the total of line construction, patrol and mopping up can be made for that particular portion of the fire line between the two points where the fire line leaves the fire and where it runs into it again.

(b) Consider the fuel within the unburned corner, the cost of burning out and the chance of the fire getting away before the corner is burned out and made safe. Don't take any chances even when it seems probable cutting across with the fire line will save 25% or even more.

The direct method should be used:

- (a) On all sides of all slow-burning surface and ground fires.
- (b) When fire is burning against the wind.

The direct method of fighting fires should be used to the greatest extent possible. *In case of doubt, use the direct method.*

A big virtue of direct fighting is that the area burns up to the fire line sooner than by other methods and the fewest chances of the fire getting away are taken if bad burning conditions later obtain before the fire is entirely extinguished. The farther back from the fire the line is built the longer it will take the area to burn out, and until it is entirely burned out or the fire is entirely extinguished there is always chance of a blow-up.

When using grub hoes and similar tools to build trench, it is sometimes necessary to trench a foot or two back from the fire in order that no burning material may be pulled outside the trench. In such cases *be sure that this strip is burned out promptly.*

### 3. *Parallel Method*

This is the method of building a fire line from a few feet to a few rods back from the edge of the fire. The use of the direct method is sometimes prevented by smoke and heat. In a few cases fires may spot badly a considerable distance ahead of the main fire and the spots may be so numerous or increase in size so rapidly that the practical method of control of these is the preparation of a fire line so as to include the spot fires with the main fire, and the burning out of the area. Use judgment and don't fail to build lines around individual spots if practical. The parallel method may be advisable on:

- (a) Fast-running surface fires.
- (b) The flanks of crown fires.
- (c) When using plows and tractors. These should be kept as close to the fire as possible.
- (d) In case of numerous spot fires.

In using the parallel method, *promptly burn out all areas between the fire line and the fire.*

### 4. *Indirect Method*

This consists of completing a continuous fire line a considerable distance ahead of the fire, and backfiring as soon as it is relatively safe to do so, all things considered. Advantage should be taken of natural or other barriers, such as streams, open ridge tops, roads, etc. (See above definition of and instructions relative to "backfiring.")

This method is seldom advisable, but is sometimes a last resort when: Humidity is very low, fuel is exceedingly dry and highly combustible, with high winds, and precipitous slopes, any one or all of these resulting in fast-running crown fires; or, when fires are traveling fast in old slashings or wind-fall where the preparation of a fire line is a very slow process, and when it is necessary to get a considerable distance ahead of the fire in order to make at all sure of completing the fire line by the time the fire approaches it.

The indirect method is an emergency method and its use should seldom be necessary. In case of doubt, do not use it. Even most running crown fires fre-



quently come to the ground, and nearly always do at night, and often can then be fought direct or by the parallel method.

## STANDARDS OF FIRE LINE CONSTRUCTION

Discussion under this heading will refer to fires which will be fought by the direct or parallel method.

While it is evident that there can be no one standard width of clearing or trenching that will apply to all fires, or as a rule to all sections of the same fire, nevertheless fire fighters have accumulated much good information by long experience and use must be made of it.

Fires may be started outside fire lines from fire within the lines in three ways (this contemplates that a line has been cleared and a trench has been dug to mineral soil, and that all roots and other combustible material have been removed from the soil) :

1. By radiation of heat across the line sufficient to raise the temperature of the fuel on the outside of line to the kindling point.
2. By flames reaching across the line and coming in contact with fuel outside.
3. By sparks and embers getting across the fire line.
  - (a) Blown across by wind or carried by air currents.
  - (b) Blown across by the force of steam generated in the burning fuel.
  - (c) Carried across by gravity (rolling, sliding, falling).
  - (d) Thrown, dragged or flipped across by workmen carelessly or intentionally.

These possibilities must be considered in deciding on the width of clearing and trenching in fire line construction.

### *Clearing*

As a minimum requirement, the removal of brush, trees, logs, etc., must be from a strip of sufficient width to allow proper trenching and patrol. Brush, and coniferous reproduction up to three or four inches in diameter, should be cleared to a width of at least four feet and logs should be moved or cut out to clear an equal width even in the case of ground fires and slow-burning surface fires. Even where a line is built through a windfall two or three logs deep, or thick reproduction that will probably crown out, the clearing seldom need be wider than ten or twelve feet.

While this section is limited to fires that will be fought by the direct or parallel method and does not contemplate fast running crown fires, there will be an occasional tree or group of trees crown out on many fires where direct and parallel methods of suppression are practical. Even most running crown fires come to the ground frequently and practically always at night and with some exceptions may then be fought successfully by the direct or parallel method. That an occasional tree will crown on most fires of any size must be kept in mind in clearing a fire line. If there is a material chance of trees in-

side the fire line and adjacent to the clearing crowning out, care must be taken to see that the crowns of such trees are separated from the crowns of trees outside the fire line by approximately six or eight feet. As a safety measure, such trees may be "crowned out" at night where practical and this menace thus removed. Usually it is practical to prevent trees near the fire line from crowning out without the necessity of felling them. The smaller conifers that might carry fire into the crowns of the larger ones near the line should be cut. Logs and any other materials, the burning of which would create much heat and which might start a crown fire, should be scattered or removed from the proximity of standing trees, or kept cooled down with dirt or water. Trees near the fire line should be trimmed and all branches near the ground removed. This is particularly necessary where trees are mossy or have low drooping limbs. In unburned corners and areas within the fire line, trenching around logs, snags, trees that might crown, etc., is sometimes the easiest and safest method.

All snags on the inside of the fire line and within 60 feet of it should be either felled or safeguarded in such a way that surface fire cannot get into them in connection with the clearing operation. Spotting over the lines from snags is an ever-present danger that should stand uppermost in the mind of the fire fighter.

As a rule the debris from clearing should be thrown outside the fire line. If thrown inside, a hotter fire will necessarily result. Where clearing can be speeded up by throwing the debris inside the line, it should be thrown inside, provided it is so disposed of that it will not materially increase the danger of fire getting away. It is sometimes advisable to throw debris inside in order to facilitate burning out or backfiring.

### *Trenching—Ordinary*

Materials removed in trenching should, as a rule, be put outside the fire line. But where trenching is materially facilitated by throwing it inside, that should be done, if it will not create a dangerous amount of heat against the line or unduly increase mop-up work or prolong patrol because of the additional time required to burn out.

After clearing a strip through brush, logs and timber, trenching must be done. The trench must be dug to mineral soil and any standard of width herein stated means the width of mineral soil exposed.

Where timber, brush or logs have been removed, the trench should be built as close as is practical to the edge of the cleared line farthest from the fire, unless it can be built right against the fire.

Trenches need not be wide, usually a width of 6 inches to 10 inches is amply sufficient. A plow furrow is enough in most cases. Where mineral soil is very close to the surface, a 6-inch trench is wide enough, except on slopes below the fire. Where trenching is through deep duff and litter, the trench must be wide enough to prevent the duff from the sides working across the



trench. It may be stated as a rule of thumb that a trench through duff and litter should be twice as wide at the bottom as the depth of the duff or litter, and in no case less than 6 inches wide.

Except on the lower side of fire, there is no virtue in digging trench deeper than to mineral soil. Time is wasted when trench is dug deeper than this. It is important that any wood imbedded in the ground and extending across the trench be dug out.

### *Rolling*

In trenching on the lower side of fires, consideration must be given to the chance of burning materials rolling or sliding across the trench. Where practical, logs should be moved if necessary to get them to lie at right angles to the contour to prevent their rolling across the fire line. Where this is not practical, or where they may roll in any event, they may often be kept in position by blocking them with rocks or piles of earth.

Not only logs, but burning cones frequently roll. Also, rocks that are released when logs and duff burn carry burning duff, cones, etc., down the slope with them. On precipitous slopes it requires a very considerable obstacle to stop rolling logs and rocks of size. A deep trench with a high, heavy bank is the least that will be half-way sure to stop this class of rolling material. A trench two or three feet deep and of equal width, with all dirt removed and placed on the lower side to form a bank may not be too much and will not stop everything. Even where soil is deep, adequate earthworks are sometimes impractical to construct. They can sometimes be reinforced by large logs laid along the lower side. These can be faced with dirt to prevent ignition. Green trees felled along the contour and left untrimmed may sometimes be effective in stopping rolling materials of size. A fire line should be built below them. Where bad conditions for rolling exist, constant patrol, mopping up and strengthening of the line is necessary after the fire line is built.

Conditions must be considered in deciding on the location of the fire line in the first place, so that the line may be built where the control of rolling material will not be too great a problem. It may in extreme cases be advisable to drop downhill a considerable distance from the fire to reach a location where the handling of rolling material is more practical.

On a steep area care must be exercised so to locate the fire line on the sides of the fire and up and down the mountain that rolling materials will give the least trouble, promptly burning out any unburned area within the fire lines.

Even where slopes are gentle and where nothing worse than pebbles and burning cones may roll short distances, trenches on the lower side of fires should be dug a few inches into the ground and a trough made to catch the burning material.

## *Cold Trailing*

Often a fire dies out in places along its edge. If the length of these dead sections is sufficient to make it worth while in using the direct or parallel method, these dead edges should be used for the fire line and clearing and trenching need not be done. A careful patrol of such sections should be established to make sure nothing has been overlooked. Very careful observation is necessary to make sure the edges are dead. Even when smoke is not visible, there may still be fire. Feel well down in the ashes with the bare fingers.

## *Noon Hour Meals*

Lunches for noon hour meal will be carried by fire fighters or delivered on line. Under no circumstances will fire fighters be allowed to bunch up off the fire line, or to abandon any section of the fire line during the noon hour. This applies both to line construction and patrol.

## NIGHT WORK CONSTRUCTING FIRE LINE

The advantages of night work in constructing fire line are:

1. Fire is not so hot, and it is possible to use direct or parallel method.
2. Keeps area burned to minimum.
3. Less wind and smoke and cooler weather, making better working conditions.
4. Longer working period with possibility of getting more line constructed before next burning period.
5. Less danger in putting men in lead of fire.
6. Less danger of fire getting away in burning out.

The disadvantages are:

1. Lack of sufficient natural light to work effectively. Use artificial lights. These make night work practical.
2. Danger of accidents to fire fighters. This is less serious if snag felling is not attempted and if men are careful in the use of axes. Usually less wind at night than in afternoon to blow trees over, but it is much more difficult to avoid rolling stones and falling trees.
3. More difficult to burn out unburned areas.
4. It is more difficult to control men, prevent loafing and get efficiency. Plenty of good overhead should be provided for night work.

## *Lights for Night Work*

Stonebridge lanterns, or Coleman type gas lanterns, or electric headlights will be provided for night work. Stonebridge lanterns are not very effective for night work but are foolproof and a fair light to travel by. From three to five men can work effectively from the light of one Coleman gas lantern.

Night work will be standard practice. Ordinarily on long period fires the working of men at night on trench construction is not as effective as getting them onto the line at daylight. When night work is done, a careful daylight



inspection is important to discover anything that was overlooked during the night.

### SPOT FIRES

Sparks or embers are sometimes carried long distances in advance of the main fire when hazard is high, and start spot fires. There is a lot of danger in windy weather of fires in tall snags and particularly of crown fires spotting badly and at distances up to one mile.

**Mandatory:** Under such conditions a man or men must be assigned to combing the country outside the fire lines to discover and extinguish any spot fires. In addition, some arrangement for lookout and special patrol service must be provided as an aid in the promptest possible discovery of any spot fires ahead of the main fire. Also regular lookouts must be diligent in their efforts to discover and report spot fires.

There is particular danger during windy weather and on steep slopes. Fires create their own draft on steep slopes, and even on small fires a diligent search must be made above the main fire to discover any spots. This is highly important if any trees have crowned out. Rolling material on steep slopes often carries fire long distances. It is important that guards give special attention to this, even on Class A fires, so as to make sure no spot fires below the main fire are overlooked. Even on Class A and small Class B fires the surrounding country must be combed for spot fires, and where a lookout can be established at all close by, it should be done, and frequent looks taken for spot fires.

### BURNING-OUT

This term is defined above. It is used in connection with the direct and parallel method of fire fighting, where the fire trench is located back from the edge of the fire, leaving a strip or corner of unburned area which may be from two feet to several rods wide between the trench and the edge of the fire.

These areas should be burned out at the time of trenching or immediately after trench is completed. Sufficient men should be assigned to this part of the job to keep pace with the trenching crew, or the trenching crew should both trench and burn out. The latter work should be kept far enough in the rear to prevent heat from interfering with trenching and to prevent sudden gusts of wind from sweeping the burning-out fires ahead and around end of trench. Snags (untouched by fire), stumps, and logs in the unburned area that are likely to cause loss of line should be trenched to prevent fire from reaching them. Trees with limbs to the ground should be trimmed or trenched around; bug-killed trees with dead needles and moss-covered trees should be "blown up" (crowned out) if wind is favorable, and if not, should be trimmed up or trenched.

The burning-out should be completed between the fire edge and trench while the construction crew is at hand to handle any break-over or spot fires, rather than to take the chance of an area burning-out when the crew is not at hand.

## BACKFIRING

This term has been defined above, and is used only in connection with indirect method of fire fighting.

In using this method, backfiring, as a rule, should be done only after line is completed or is far enough advanced that the backfire will not sweep around the end of the line. Since there is usually a large volume of unburned material between the fire line and fire, the backfire should not be started until wind is in right direction to carry the backfire away from the fire line, or at night from 9:00 p.m. to 5:00 a.m. Also, all snags for 100 to 200 feet within the strip to be backfired should be felled prior to backfiring.

Roads, streams and open strips should ordinarily be used as bases from which to backfire.

If there is danger of main fire crossing trench before night, backfire in daytime, preferably from 5:00 a.m. to 11:00 a.m., if possible.

The backfire must not only clean up all inflammable material on the ground, but also all crowns must be cleaned out, as far as possible. Use gas, kerosene, or other inflammable material if necessary, but burn out these crowns. If this is not done the fire will go through the unburned crowns and cross the fire line. The backfired area should be of sufficient width to bring a crown fire to the ground and catch most of the flying embers and sparks thrown out by the advancing fire.

Usually from 100 to 200 feet is sufficient width to work the backfire in from the trench and within which to fell snags. In extreme cases it may be necessary to burn a wider strip in the lead of a fast-running crown fire. Later, in mopping up, it may be advisable to remove snags for a greater distance inside the fire line. The standards under "mopping up" should then govern.

## PATROL

It seems advisable to say that patrol, especially night patrol, has been an overworked feature of fire control in the past. Actually, it is only a part of the general job of mopping up, and every so-called patrolman should be kept busy cooling and putting out the fire and strengthening the fire line where needed.

### *Night*

In the past in entirely too many cases an excessive number of men have been kept on night patrol. Actually there is as a rule little need for night patrol between 10:00 p.m. and 5:00 a.m. Occasionally in steep country there are places where burning material may roll across the line. There are sometimes windfalls close to the line constituting very hot spots. There are burning snags likely to fall across the line during the night and from which, while standing, sparks and embers may be blown across the line. If inflammability is high, it will be necessary to keep a man or men on during the night to keep watch in these dangerous places and to strengthen the line and cool the



fire down and mop up. If there is no need for strengthening the line, cooling down and mopping up, then there is no need for night patrol. The point is that any one needed on night patrol should work improving the fire line and mopping up. Ordinarily night work, including patrol along a constructed line, should be confined to the bad spots and the number of men to be assigned to the so-called night patrol should be determined with this in mind. On any considerable length of line nearly always most of it needs no night patrol.

Under the policy herein stated it may be that the fire will sometimes get across the line during the night at other places than the bad spots mentioned and where there will be no patrol. If so, it can be controlled by the day crew in the early morning and usually with a very small amount of work.

Early morning inspection of unpatrolled line is essential. Patrol work should be in charge of the most reliable overhead.

### *Day*

Whether the so-called patrolman is on night or day work, he should work strengthening the fire line where needed, cooling down the fire and mopping it up. The fact must be recognized that active work felling snags, cooling hot spots, and mopping up generally will immensely hasten the time when the fire will be safe. When patrol is necessary during the day, there is always work to do on some of the jobs mentioned. If there is no work to do "on" the line, there will be work to do "inside" the line, nearly or entirely up to the time the fire is out and the last man can safely leave. After a fire line is constructed effort should be made to hold it and to prevent the fire from crossing and getting away. Until mopping up is well completed a heavy patrol is often necessary on some sections of line during bad burning periods and during parts of the day. Day patrol seldom needs to be heavy before 10 a.m.

As a rule for a day or two after the area adjacent to the line has been mopped up to standard, from two to five men per mile of line should be sufficient for day patrol. After this the patrol can usually be reduced. There should be other fire fighters who can be gotten on to any section of the line within an hour or two if needed. Plenty of men should be kept on a fire until it has been well mopped up. After the fire line has all been constructed, most of these men will be kept inside the fire line mopping up. They will be available to assist in holding the line when and where and if needed. Patrolmen should be kept informed as to where to get help at any time.

Patrol will be lightest at night and heaviest in the afternoon. It is important that there be plenty of overhead for patrol and mopping up work. This overhead must first distribute their men and show them what mopping up and other work to do. The overhead must then keep moving in order properly to supervise the work, since men will usually be scattered and they will need lots of instruction and direction.

## BURYING BURNING MATERIALS AND USE OF DIRT IN FIRE SUPPRESSION

There are several important uses of earth in fire suppression. One is the use of dirt to quiet a fire. Flames may often be quieted by throwing a few shovels of dirt on them and very hot sections where direct fighting is otherwise impractical may be cooled sufficiently to allow direct fighting. Dirt thrown on flames going up trees may often prevent the trees crowning out.

Where there is nothing but coals and no flames, the use of a little dirt may prevent sparks and embers being blown across the trenches or prevent the fuel bursting into flame and the fire gaining much headway and getting away. Even after a fire is completely trenched, it is important to keep it as quiet as possible particularly during periods of low humidity or windy periods until the last spark has died. When it is safe to do so, the fuel may be stirred or turned to hasten its burning up.

The uses of dirt mentioned are only of temporary help. Fuel on fire may be buried so well that it is safe to leave the fire as out. If the fire is to be left as out, burning fuels must be completely buried deep in mineral soil; must be completely surrounded by several inches of mineral soil. The lower the burning material is put in the ground, the safer, since the less the chance of dirt sliding off or of wind blowing it off. Burying or burning may often be facilitated by cutting off burning portions of logs, etc., and burying or burning such portions.

There must be careful supervision of the work of burying burning fuel, since a poor job may result in a blow-up any time, even many hours later. *Never bury any burning material in or with duff.* Use pure mineral soil.

Do not attempt to bury too large a log or stump, only a part of which is on fire. Cut off and bury the burning portion if that will facilitate the work.

### MOPPING UP

Mopping up refers to the work done on a fire inside the outer limits of the fire or burn. The fire should be put out as soon as possible. The quicker it is put out the sooner the cost of suppression stops. There is no positive assurance the fire will not get away until it is entirely out. A fire may be well trenched and the area burned everywhere on the surface up to the trench and the fire dead at and near the trench. Even then sparks may be blown across the trench from a burning snag or a crowning tree at a considerable distance inside the trench; or burning logs or other material well inside the lines may create enough heat to start a crown fire which may run across the trenches.

Clearly, then, all fires within the trenches, sparks, or embers from which may be blown across the trench or fires which may get into the crowns and then escape must be made safe as soon as possible and before the fire is abandoned.

Burning snags should be cut to a sufficient distance back from the trench



so that there is little possibility of sparks from the top of a snag crossing the line, or of snags falling across or falling and sliding or rolling across the line. The location of snags must be carefully considered in felling operations, and all that constitute a menace must be felled. Watch particularly snags on open points or exposed ridge tops.

Some burning material should be buried in mineral soil; other material should be kept stirred up in order to hasten its burning out. Play safe and get the fire controlled and out as soon as possible.

Burning logs may be removed from the vicinity of standing trees as a precaution against the crowning out of the trees. Logs not on fire and unburned areas within the fire line may be trenched around to prevent their getting on fire. It should be emphasized that sparks and embers from crowning trees are carried the maximum distance.

Where more than one line of action is practical in mopping up, use that method which is reasonably safe for the time and that will get the fire in shape to abandon at the earliest date and keep the expense of suppression to a minimum.

Standard practice will be to do mop-up work from edge of fire in toward center of fire, coincident with or following immediately behind line construction.

Mop-up will be continued aggressively until all danger of blow-up is eliminated, even under high wind or other adverse conditions.

Where water is available, gas pumps cut down mop-up and patrol time if used in wetting down the burned area, putting out fires in logs, snags, stumps, etc.

Burning roots underground offer a menace that should be carefully taken into account. Fire has been known to follow one of these roots through the ground for considerable distance before the root comes close enough to the surface of the ground for the earth to cave in and allow the vegetation outside the trench to catch fire and spread. This may be controlled by digging the fire from the burning root and then filling in around root with mineral soil to exclude the air. Burning roots under the trench must be looked for and carefully guarded against. Decayed logs under ground also offer the same hazard.

Unburned areas inside fire line must be trenched, burned out, or fire-proofed by removing all inflammable materials (such as needles, duff, scorched brush and timber, unburned logs, low hanging limbs), trenching around snags and cat-faced trees, or such other precautionary measures as are necessary to prevent dangerous flare-ups inside the fire line.

Mop-up work must be made the object of a sustained drive to quickly prepare fire for high wind and low humidity conditions.

## STAY WITH FIRE UNTIL OUT (MANDATORY)

A fire is under control when fire line is completed and fire is mopped up to point of safety. Usually a fire is under control some time before it is out and before it can be abandoned.

The first-line men will stay with the fire until it is out or until they are told to leave it. (Mandatory.)

Fires will not be abandoned until entirely out or well buried in mineral soil. The exception to the rule relative to staying with a fire is when a number of fires occur at once, as during a lightning storm, and there are not enough first-line men to man them all. Then the practice is to make one fire reasonably safe and go on to the next, returning later to extinguish the first fire or sending follow-up men to complete the work. First-line men will make a personal check-up to assure themselves that all fires are out, which are left to follow-up men, per diem guards, or temporary help, to extinguish.

In addition to a check-up on fires handled by men who are not members of the regular fire organization, it will be standard practice to have members of the regular force return within the next 48-hour period to fires reported to be out, unless other urgent fire duty prevents.

Failure to observe the rule of staying with a fire until out will result in personnel action, regardless of time of year, burning conditions or other factors which might lead to the belief that a fire could be safely left before it is entirely out.

Fire in dead timber, snags, slide-rocks, beargrass, roots, stumps, deep duff, rotten logs, sawdust, and similar materials, should not be left unattended for a period of more than 24 hours after last smoke is seen, unless it can be and is rechecked within that period.

One or more men (depending upon size of fire) will be held on each Class C fire, a minimum of 5 days after the last smoke is seen.

## INJURED EMPLOYEES

### *Relief Under U. S. Compensation Law*

Employees injured while in the performance of their duty are entitled to relief under the U. S. Compensation Act of September 7, 1916, as amended, and all cases should be handled as follows:

1. Administer first-aid. (First-aid kits at all fire camps.)
2. Communicate with superior officer or Supervisor's office promptly, who will instruct regarding medical aid and further handling of the case.

If for any reason communication cannot be had with superior officers, steps should be taken to see that injured employee is given medical aid as soon as possible. All injured employees should, if possible, be referred to designated physicians. If services of a designated physician cannot be secured promptly, employee should be referred to any other available physician. In



all such cases a request for treatment should be issued by the officer in charge either on Form C. A. 16 or C. A. 17, whichever is applicable in the case. (See instructions on the back of these forms in timekeeper's kit.)

The Supervisor will see to it that each Fire Handbook on his forest is supplied with a list of designated physicians in his territory.

3. The following U. S. Compensation Commission Reports should be filled out promptly as indicated. (Forms in timekeeper's kit.)

C. A. 1—Notice of Injury: Should be immediately filled out completely for signature of the injured employee.

C. A. 2—Official Superior's Report of Injury: Should be filled out as completely as possible on the ground for signature of reporting officer (forest officer in charge of fire).

Be sure that answers to similar questions on both forms agree, i. e., date and hour of injury, etc.

Witnesses to Injury: Names of witnesses shown on C. A. 1, Q. 4, and C. A. 2, Q. 33 must be the same. Statements of witnesses on page 2 of C. A. 2 must be filled in and signed by such witnesses as soon as possible after the injury (the same day if possible). If such statements cannot be secured on the Form C. A. 2, they should be made on plain paper and signed, to be attached to the C. A. 2 later.

All injuries, regardless of how minor in nature, must be reported on Forms C. A. 1 and C. A. 2 and reports forwarded to Supervisor's office.

#### *Relief Under Act of March 3, 1925*

Relief for sickness or injury may be provided for employees as follows for all cases that do not come within the scope of the U. S. Compensation Law:

1. First aid administered on the ground.
2. Medical attention for employees at isolated situations whose condition will not permit of removal to a point where medical attention can be secured.
3. Transportation of employees from isolated situations to points where medical attention can be secured.
4. Transportation of the body of an employee who died at an isolated situation to a point where the body can be prepared for shipment or burial.

*No expenses of any kind will be allowed* after the employee has been transported to a point where medical attention is available.

Before taking action under 2, 3 or 4 above, communicate either with superior officer or Supervisor's office, if communication will not delay prompt action and endanger the patient.

## PROTECTION OF PRIVATE PROPERTY FROM FOREST FIRES

Forest fires frequently threaten and endanger private property. Sometimes the owner of the private property, or his employees, fights the fire mainly or altogether for the purpose of saving the private property and accomplish nothing worthwhile in protecting the National Forests and the Government's interests. Obviously, in such cases the Government should pay the owner or his employees no wages.

Or, Forest Service employees fight such fires primarily to save the private property, accomplishing nothing material in protecting the Government's property and interests. The owners of the private property in such cases frequently provide vegetables and other provisions and meals to the Government's employees, and occasionally they furnish horses for packing to the Government's men mainly engaged in protecting the private property. The owners of the private property should expect nothing for these supplies nor for use of horses in such cases.

To the extent the private owner through his own or his employees' efforts assists the Forest Service in protecting the Government's interests, he should be paid for labor, horses and supplies.

### REVIEW OF FIRE SUPPRESSION WORK

In order to insure more fully and promptly in fire suppression:

1. Proper credit being given for good work;
2. Bad practices and failures being discouraged and remedied;
3. The fixing of responsibility;

all Class C fires, and all Class A and B fires when the suppression cost exceeds \$100 for labor will be reviewed not later than some time during the winter following the fire, by a board consisting of at least the district ranger, on whose district the fire occurred, and a member of the Supervisor's office of the forest concerned. For some of the larger fires, the Regional Board of Fire Review will sit in. The Regional Forests will decide what fires the Regional Board will help review.

At least these points will be fully considered in each review:

(See individual fire report.)

1. Cover types, slope, exposure.
2. Weather conditions and inflammability of materials.
3. Each element going to make up total elapsed time, first line defense.
4. Getting second line defense men onto fire; where obtained; routing, transportation. How determine number needed.
5. Sufficiency of tools, equipment and provisions and keeping tools in shape. Use of plows and other power equipment.
6. Transportation of tools and equipment and provisions to fire.
7. Inspection and correlation by ranger, Supervisor's office, and Regional Office. Adequacy of overhead on the fire.
8. Organization of men at all stages of fire for suppressing it.
9. Reconnaissance of fire.



10. Initial attack on fire. General strategy in fighting the fire.
11. Hours of work; start in the morning, night work, etc. Approximate number of men in each of the different shifts. Distance of camps from fire.
12. Day by day progress of fire and of suppression work.
13. Performance of straw bosses and crew bosses and men in charge of the fire.
14. Standards of suppression practices:
  - (a) Width of trench and of clearing.
  - (b) Direct or indirect fighting, etc.
  - (c) Burning out and backfiring.
  - (d) Patrol.
  - (e) Mopping up and number of men kept.
  - (f) When fire finally abandoned.
15. Acreage burned, damage and cost. Length of constructed line; length of held line; chains built per man per hour. Consider all men actually on fire line, fire fighters, straw bosses, foremen, etc., to determine this and include contributed time of anyone on the fire. Do not include camp men, packers into camp, etc.
16. Total cost per chain of all line built; of all line held. Consider entire cost of the fire, including camp as well as line men, transportation, provisions, and contributed time. Do not include equipment.
17. Conclusions as to whether fire was handled to good advantage and reason for success. If not successfully handled, state in detail why not, and what should be done to get better results in the future. In this connection, consider fire plans, personnel and their training, tools and equipment, permanent improvements. Could fire have been prevented?
18. Was special man employed to get fire cost data?

A memo should be written of each review, copies being furnished the Supervisor, the Ranger and the Regional Office for permanent record.

#### *Public Domain Fires and Fires on Other Than National Forest Lands*

While the situation may greatly change soon, nevertheless during the past season the Interior Department had no funds with which to fight fires on the public domain.

Under this condition the following policy has been adopted:

The Forest Service will promptly attack and will suppress all fires on other than National Forest lands, the presence of which threaten National Forest lands, when other agencies will not take prompt and effective action.

All fires that will probably spread and do much damage on the public domain will be reported promptly to the proper agent of the Interior Department or to the Regional Office by the Supervisor of the forest nearest the fire.

The Forest Service has no authority to use either FF or S. & E. to fight fires not on or threatening the National Forests except under certain cooperative agreements.

CCC's may, where practical, be used to fight fire on the public domain even if National Forests are not threatened, provided it is probable a fire will spread and do much damage if it is not suppressed.

#### *Form 928, Supervisor's Ten-Day Fire Report*

This report should be submitted on Form 928 beginning as of June 10 each year, and should be mailed to reach the Regional Office by the 10th, 20th and last day of each month, including September 30, or until the close of the fire season. Forests having delayed mail service which justifies telegraphing this report should prepare a telegraphic report in accordance with the following:

(a) Cumulative total of FF expenditures and liabilities for the entire *fiscal* year to the end of the ten-day period covered by the report: Sum of suppression plus emergency guards. Telegram code word "expenses."

Balance of information requested in following paragraphs will be for "calendar" year.

(b) FF chargeable to emergency guards this *calendar* year to date. Telegram code word "emergency."

(c) Number of emergency guards being paid from FF on the last day of the ten-day period. Telegram code word "guards."

(d) Area burned, both private and Government, inside National Forest boundaries, this *calendar* year to date. Telegram code word "area."

(e) Estimated damage net N. F. land, *calendar* year to date. Telegram code word "damage."

(f) Number of extra period fires *calendar* year to date. (Include Class A as well as Class B and C fires.) Telegram code word "extra."

(g) Total number of fires to date for *calendar* year. Telegram code word "total."

(h) Number of man-caused fires *calendar* year to date. Telegram code word "man."

(i) Percent Class C fires *calendar* year to date. Telegram code word "see."

(j) Concise statement of conditions and outlook for the next ten-day period.

For example: *Expenses thirty four thousand six hundred ten emergency eight thousand four hundred ten guards none area eight hundred ten damage two thousand extra none total six hundred.*

This should then be followed by the "concise statement" mentioned under (j) above.

#### *Form 924, Supervisor's Annual Fire Report*

Report on Forms 924 (sheets 2 to 8, inclusive) will be submitted by each forest to reach the Regional Office on or before January 15 of each year.

Yellow Forms 924 may be used in the Supervisor's office for rough draft work. The white copy showing yearly totals should be submitted to the Regional Office as instructed in the above paragraph. These reports will be re-



turned to the forests after they have been checked and the data transferred to similar forms maintained in the Regional Office.

Instructions on Sheet 1 of Form 924 should be studied and closely followed, since it is necessary to return for correction any forest sheets which indicate insufficient care in compiling these figures.

Use an extra line to show ECW costs on Sheet 8 (b) of Form 924. These ECW figures should be parenthesized and should not be included in the other regular cost figures.

The Regional Office will compile the annual forest totals by forests by States on Form 924, keeping them for the annual permanent record. Copy of these sheets, atlas size, will be sent the Forester by March 1 each year. Letter-sized photostat copies of this report will be sent the Regions and R-4 forests.

The annual regional total data will be entered on the R.O. 10-year summary, and photostat copy sent the Forester by March 1.

#### *Form 930, Fire Statistical Sheets A-LM*

This report should be submitted to the Regional Office by the forests on or before February 1 each year.

Instructions are given on the reverse of Sheets A-LM for their preparation. Supplemental instructions are contained in mimeographed form in each forest atlas binder. Particular attention should be given by each forest to make certain the data on these sheets are consistent and in agreement with the Supervisor's Annual Fire Report, Form 924.

Each forest in Region 4 should submit annually to the Regional Office Sheets A, B, K and LM.

Sheets C-D, E and J will be sent the Regional Office by the following eleven forests only:

Boise	Sawtooth
Challis	Targhee
Idaho	Teton
Lemhi	Weiser
Payette	Wyoming
Salmon	

Sheets F, G, H, and I are not to be submitted to the R. O., but should be compiled and kept in the fire atlas on the eleven forests shown above.

ECW costs in parenthesis should be shown on Sheet A.

After the forest reports have been checked in the R. O., the data will be transferred to the R. O. records, and the Supervisor's copy returned.

By March 1, annually, the Regional Office will prepare letter-sized photostat copies of summarized Form 930 (Sheets A, B, C-D, J, K, and LM) showing yearly Region 4 totals, and forward copies to the Forester, the Regions, and R-4 forests. Photostat copy of Sheet A by forests for the current year will also be so distributed.

## FIRE DAMAGE APPRAISAL, REGION FOUR

### *Individual Fire Report, Form 929-B-C*

Section P of this form will be filled in for all Class B and C fires, by a competent forest officer, to show as accurately as practicable all information except the actual damage value in money. This latter item will be filled in by the Supervisor's office. Where time will permit, the field information for this section should be determined and recorded promptly after suppression of a fire. If a serious fire situation makes delay necessary, information for Section P may be gathered later in the same season, but in no case should this delay be longer than the following season. Ocular estimates for Class B fires will be sufficient unless high values are involved. For all Class C fires and for Class B fires where high values are involved, a cruise will be made to obtain needed data. When cruises are made, the following instructions will be followed:

1. *Time after burn.* Where complete or nearly complete destruction of timber resulted, cruise can be made immediately after fire. This would include in general such types as Ponderosa pine and Douglas fir.

Where partial killing occurs, as in Ponderosa pine, cruise should not be made till late fall.

2. *Cruising methods.* Use sample strips on all merchantable timber and young growth areas. A 5 per cent cruise (one strip per 40) should be employed. On protection forest, protection brush, and non-timber types cover only enough ground to map area. Use in general a one-chain strip. Cruise National Forest land only.

3. *Layout of strips.* Strips need not be run in cardinal directions, but should be planned to gridiron the burn effectively.

4. *Mapping of types.* Preparation of topographic map not essential. Major types should be distinguished and mapped as follows:

a. Timberland:

1. Old growth segregating principal types.
2. Young growth which will not restock naturally, including restocking burns, cut-over areas, and second growth.
3. Young growth under mature timber.

b. Protection forests:

1. High altitude non-commercial forest.
2. Chaparral and non-timber brush.

c. Woodland.

d. Barren, grass, sagebrush, and similar types.

5. *Mapping of Areas.*

- a. Show area of entire burn, including private land.
- b. Show National Forest and private land; area inside and outside of National Forest boundary.
- c. For timberland and protection forest show:
  1. Area completely killed.
  2. Area partially killed.



6. *Mapping of Site Quality.* Recognize three qualities in each major type, based on height of timber. Such a system of classification is given below. For young growth define site by reference, where possible, to adjacent virgin timber. Site qualities should be mapped.

7. *Field Tally in Merchantable Timber.*

- a. Where most or all of timber is killed, tally separately dead and live trees by diameter. Take measurements of merchantable height as well as of diameters, and use existing volume tables for determination of volumes.
- b. With partial killing, tally separately dead, live and doubtful trees. The latter are defined as trees with crowns not consumed by fire, but browned except for small parts. Intensive local studies are needed to determine proportion of doubtful trees that die. Preliminary investigation indicates that this varies from one-fourth to one-half. The former is a safe figure to use.

*Special Data for Section P, Form 929-B-C*

The following two tables are given specially to assist the reporting officer to give suitable information under Columns P-B "Rating" (c) and P-D "Site" (h) :

*Rating of Protection Forest Types  
Block P-B Column (c) "Rating," Form 929-B-C*

1. Great damage plus intensive use.
2. Moderate damage plus intensive use.
3. Heavy damage plus moderate use.
4. Moderate damage plus moderate use.
5. Heavy damage plus light use.
6. Light damage plus great use.
7. Relatively remote watershed values.

*Indicators of Site Qualities Based on Height in  
Feet of Dominant Trees in Stand*

	<i>Good Sites</i>	<i>Medium Sites</i>	<i>Poor Sites</i>
Ponderosa pine	115 to 145	85 to 115	-70 to 85
Larch	150 to 180	115 to 150	-100 to 115
E. spruce	135 to 150	115 to 135	-95 to 115
Douglas fir	120 to 140	100 to 120	-90 to 100
White fir	135 to 150	110 to 135	-95 to 110
Lodgepole	85 to 90	75 to 85	-70 to 75

In using the foregoing table, care should be taken to view and estimate the height of representative *dominant* trees. The characteristics of the best trees to be found are the best indicators of the *true quality* of the site.

### *Values, Merchantable Killed and Young Growth, R-4*

These figures are given for information of field officers but will be inserted in the individual fire reports, Form 929-B-C, only by the Supervisor's office.

#### *Stumpage Prices Applicable to Merchantable Material Killed*

Species	Price Per M Feet Log Scale	
	Zone 1	Zone 2 *
Ponderosa pine.....	\$3.00	\$1.50
Lodgepole.....	3.00	1.00
Engelmann spruce.....	2.50	1.00
Douglas fir.....	2.50	1.00
White fir.....	1.50	.50

\* Zone 2 applies to interior of Salmon, Teton, Idaho, Sawtooth, Payette, Boise, Challis, and Weiser Forests. Maps have been furnished these forests showing extent of Zone 2. Other forests will use Zone 1 values only

#### *Value Per Acre of Young Growth*

Timber type	Good Sites			Medium Sites			Poor Sites		
	Age 20	Age 40	Age 60	Age 20	Age 40	Age 60	Age 20	Age 40	Age 60
Ponderosa pine	\$2.00	\$3.50	\$7.00	\$2.00	\$3.50	\$5.50	\$2.00	\$3.00	\$4.50
Douglas and mixed fir	2.00	3.50	6.00	2.00	3.00	5.50	1.50	3.00	5.00
Lodgepole pine	1.50	2.50	4.50	1.50	2.50	4.50	1.50	2.50	4.00
Woodland	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
Protection forest	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Grass and brush	30 cents			20 cents			10 cents		

#### *Instructions For Use*

Follow Region instructions for determination of site and type.

Determine age class of young growth destroyed.

If natural reproduction is expected to follow fire, use values in above table.

If planting will be necessary to restore forest, add \$5.00 to above values.

If only part of reproduction is destroyed, use that percentage of above values.

For timber of merchantable size, use following values per M feet B.M.: Ponderosa pine, \$3.00; lodgepole, \$3.00; spruce, Douglas fir, \$2.50; white fir, \$1.50.

Special products should be converted into M feet B.M.

Age 20 is intended to correspond to seedlings and saplings; age 40 to small poles; age 60 to large poles.

The Supervisor's atlas contains copy of "O—Fire, Damage Appraisal" circular of April 27, 1925, with amendments which give full details regarding fire damage appraisal.





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